



# Recent developments in higher maritime education in Croatia

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## ABSTRACT

During the last five years, maritime education in Croatia underwent changes in programmes, possible educational paths and students' structure. This paper analyses the recent trends in maritime education in Croatia with particular references to enrolment and graduation processes at higher Maritime Education and Training (MET) institutions. The aim was to examine the students' structure developments and the correlation between recent economical fluctuations in Croatia and attractiveness of seafaring among young people.

The authors have examined data gathered from two higher MET institutions in Zadar and Rijeka from 2010 to 2014. The results of the research have shown that GDP fluctuations i.e. the economic situation in the state has an influence on the enrolment at higher MET institutions. Furthermore, the results have shown that grammar school graduates and those from other four-year vocational schools are starting to choose seafaring as their profession increasingly. Today, in both cities, traditionally oriented to seafaring, students enrolled at higher MET institutions who graduated from maritime schools are significantly in the minority.

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## 1 Introduction

Croatia has a long maritime tradition and seafaring is traditionally one of the most prominent professions in coastal areas. Consequently, maritime education in Croatia is offered by a number of institutions<sup>1</sup> at three different levels: in maritime training centres<sup>2</sup>, in secondary schools and at universities. The number of active seafarers in Croatia is estimated to 20,000, which, relatively to the total population of the country, is 0.47%. Even if the absolute number of seafarers seems not to be large, Croatia is among other countries worldwide with the highest incidence of seafaring profession [1].

<sup>1</sup> There are eleven MET institutions in Croatia. Four institutions offer the management level programmes and seven institutions offer operational level programmes. Higher MET institutions are part of respective universities. All programmes are in line with the STCW Convention. The National Maritime Transport Authorities, the National Higher Education Authorities and the European Maritime and Safety Agency (EMSA) regularly evaluate MET institutions.

<sup>2</sup> Maritime training centres are almost all privately owned, profit-oriented and offer only "STCW short courses". On the other side MET institutions are all state-owned, non-profit and offer programmes for Deck Officers and Marine Engineers in accordance with the IMO Model Courses, 7.01 to 7.04. Some MET institutions also offer STW short courses to seafarers.

From the total number of active seafarers 15.184 (~76%) are engaged in international navigation, from which 70.5% are officers [2]. The rest is engaged in national navigation.

**Table 1** Croatian seafarers engaged in international navigation

Deck department	6873 (45.3%)
Engine department	6590 (43.4%)
Catering department	1177 (7.8%)
Other	544 (3.5%)

Source: [2]

There are also a number of ex-seafarers of which a certain percentage every year returns to active service.

The first MET institution in Croatia was the secondary<sup>3</sup> maritime school (Pomorska škola Bakar) established in 1849. The first higher MET institution was established in 1949 in Rijeka (Viša pomorska škola u Rijeci). In 1978, this institution as the first in Croatia became a member institution of the University of Rijeka [3]. Since 1962, the

<sup>3</sup> In this paper the term "secondary school" is preferred over "high school" in order to avoid confusion with "higher education" which is actually post-secondary education.

higher maritime education has been required as mandatory for senior deck officers and marine engineers, thus establishing Croatia as one of the first European countries requiring higher education for top ranking positions on board merchant ocean-going ships.

The most common seafaring career path in the past started with the maritime secondary education offering knowledge and understanding at an operational level. Secondary-school graduates have usually spent one year on board ships (sea-time required for the officer of the watch Certificate of Competency) and then continued with management level education required for senior officer positions at higher MET institutions. However, some of them choose to continue to work as officers of the watch without management level education, while the majority of them continue their education few years later.

Today, the Higher MET education in Croatia follows the university standards according to the so-called Bologna model. It started with three years of undergraduate study (Bachelor degree), followed by two years of graduate study (Master degree) and three years of Postgraduate study (Ph.D. degree). The International Convention on Standards of Training, Certification and Watchkeeping for Seafarers (STCW) requires knowledge, understanding and skills as part of the undergraduate study.

The above-mentioned career path was practiced almost as a rule for half-century. In the authors' opinion this well-established and systematic education offers a very appropriate mixture of academic advancement and practical training, and is probably "responsible" why Croatian seafarers have been recognized as well educated<sup>4</sup> and serious seafarers esteemed at the international labour market.

## 2 Setting the scene

In 2009, maritime crewing agencies, supported by several shipowners kick off a campaign proposing alternative carrier paths for seafarers who did not graduate from higher MET institutions and who have been on board a ship for at least 5 years. The main reason for this request was the increased demands for qualified seafarers on the market, significant shortage of seafarers, particularly marine engineers, and quite high salaries offered. The campaign, although several times suspended and reinitiated, finally succeeded and in 2011 the Ministry responsible for the safety of navigation amended relevant regulations and approved the Special Education Programme for Seafarers.

The programme lasts six months and has two basic requirements for admission: the participant must be a secondary-maritime school graduate covering knowledge, understanding and skill at the operational level, as required by the STCW Convention, and must have at least 36 months of aggregated sea service as an officer. By suc-

cessfully completing the programme, attendants are entitled to apply for exams for either the unlimited Master or Chief Engineer Certificates of Competency, respectively. They are not entitled to any form of graduation diploma or a similar certificate that can be recognized by any other authority.

The new programme has opened a new career path for all students at secondary maritime schools. But in addition, this new programme has also pushed higher maritime institutions to reconsider their enrolment policies because there are tangible chances that a significant number of graduates from secondary maritime schools will not continue their education on higher MET institutions.

Beside these changes, recent economic developments in the country have also changed the position of seafaring at the international labour market. Croatia was one of the most developed republics of the former Yugoslavia and Croatian (Yugoslav) seafarers were the first Eastern Block seafarers (of socialist countries) that were allowed to sail on board foreign ships. In the early 90's, Croatia suffered the major economic loss which resulted in a significant drop of the GDP during the war and in the post-war years. Consequently, the number of would-be seafarers increased significantly. The economic revival started in the early 2000's and lasted for 7 to 8 years. A decline of interest in seafaring, recorded at that time, was mostly caused by an increased attractiveness of shore-based careers and unwillingness of qualified young people to join the demanding industry.

However, the economic situation changed once again and the economic crisis peaked again in 2009. This time, the roots were in the international economy. The recovery from recession in Croatia was slower than in the rest of Europe. The first positive signs have been recorded right now. As a result, the prolonged period of recession and economic instability in the country has definitely promoted seafaring (again) as a very attractive profession for young people. But this time, the attractiveness is mostly recognized by students who graduated from non-maritime secondary schools, mostly from grammar schools.

Finally, during the last 15 to 20 years significant changes took place at the international labour market. International shipping has become a technologically matured industry, ships have become highly sophisticated, and shore support has turned out to be an intrinsic part of the system. As a consequence, work contracts have changed significantly in a way that sea-time is now much shorter and in most cases lasts between two and four months, with an equal or slightly shorter time ashore. Salaries for top ranking positions are again very attractive and much higher than those offered ashore. At the same time maritime crewing agencies<sup>5</sup> have developed and thus being able to efficiently serve the industry and

<sup>4</sup> Just as an example, Croatian top ranking officers were required to master university level mathematics as far back as the early fifties.

<sup>5</sup> Maritime crewing agencies are legally regulated in Croatia in 2008 and since then have significantly influenced the seafarers' labour market in Croatia.

the seafarers as well. All this resulted in an increased number of Croatian seafarers working for well-known foreign companies, further promoting profession as the one that can offer high living standards and economic stability.

Therefore, it is reasonable to assume that MET system have also felt certain changes caused by these influences. Probably the most sensitive segments of any education system to external disturbances are enrolment and graduation processes. Therefore, in the following chapters certain trends in the enrolment and graduation procedure at higher MET institutions will be discussed with a particular emphasize on two higher MET institutions: both the Rijeka and the Zadar one. The data used cover the period between 2010 and 2014. All data concerning applications for enrolment, average marks of applicants, marks earned during secondary-school education, marks earned at school-leaving examination as well as data of graduated students were collected from electronic databases and extracted manually from the students' records.

These preliminary data are considered not sufficiently reliable due to changes in the study programme duration (in previous years, all the STCW required subjects were lectured during the first two years of study and a number of students actually left after two years of study without taking a degree, but with a certificate allowing them to pursue a career as a ship officer).

### 3 Recent MET developments in Croatia

Higher MET institutions in Rijeka and Zadar share several similarities: both have long maritime tradition, both have secondary maritime schools and higher MET institutions as a part of the respective universities. Both cities are recognized as urban centres where a large number of active masters and officers have their residences.<sup>6</sup> If maritime labour-supplying capacities and other related services to shipping are taken into account (such as maritime training centres, crew-management agencies, shipping companies, etc.) both cities may be considered as a service centre offering human resources to international shipping.

The cities are similar but also very different: Rijeka is a larger city, once industrial centre but now in transition; Zadar is a smaller but fast developing city, with numerous islands, strong tourism and agriculture in the neighbouring areas. Rijeka and the adjacent suburban areas have approximately 30% higher GDP than the national average, while Zadar and its neighbouring suburban areas have approximately a 10% lower GDP.

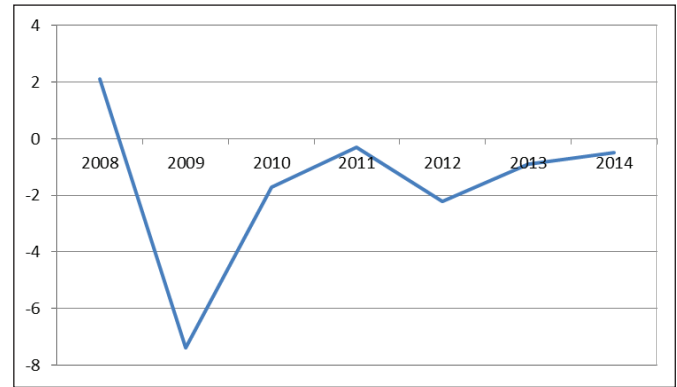


Figure 1 GDP changes in Croatia between 2008 and 2014

Source: The authors according to [4]

In order to estimate conceivable responses to external influences, the higher MET institutions seem as much better subjects than secondary schools or any other segment of shipping. There are several important reasons for targeting higher MET institutions:

- applicants are at least 18 years old, thus very much aware of the importance of higher education for their personal standards of living and wellbeing,
- there is a restricted number of enrolments at each institution (imposed by responsible education authorities) and usually smaller than the actual demand,
- applications for enrolment are received from candidates coming from three different types of schools: from secondary maritime schools, from grammar schools and from other four-year vocational schools.

Most of the applicants who graduated from maritime secondary schools continue their education at higher level but it is not imperative. Very few are ready to continue education in fields that are not maritime-related. Contrary to that, graduates from grammar school are prepared to continue education at a university level. Grammar schools are widely recognized as schools offering sufficient knowledge to continue education in almost any field of science. Finally, graduates from other four-year vocational schools are mostly applicants who have decided to switch to maritime career after they graduated from secondary school.

As collected from available data, it is obvious that the number of applicants has been generally decreasing from 2010 onward. The trend is much clearer in Rijeka, particularly as regards the deck department. The number of applicants in Zadar is much smaller, and since 2012 this trend has been recognized as such. The maximal value has been reached almost a year after the most dramatic drop in GDP. Therefore, these trends can be correlated with a slow economic recovery, particularly in respect with a deep fall in 2009. One has to take into account that the number of applicants in Rijeka is approximately ten times larger than in Zadar while the enrolment capacity is only two times larger.

<sup>6</sup> Based on the data available at Harbour Master's Offices in Rijeka and Zadar it is estimated that at least few thousand seafarers (mostly officers) live in these cities and their wider suburban areas.

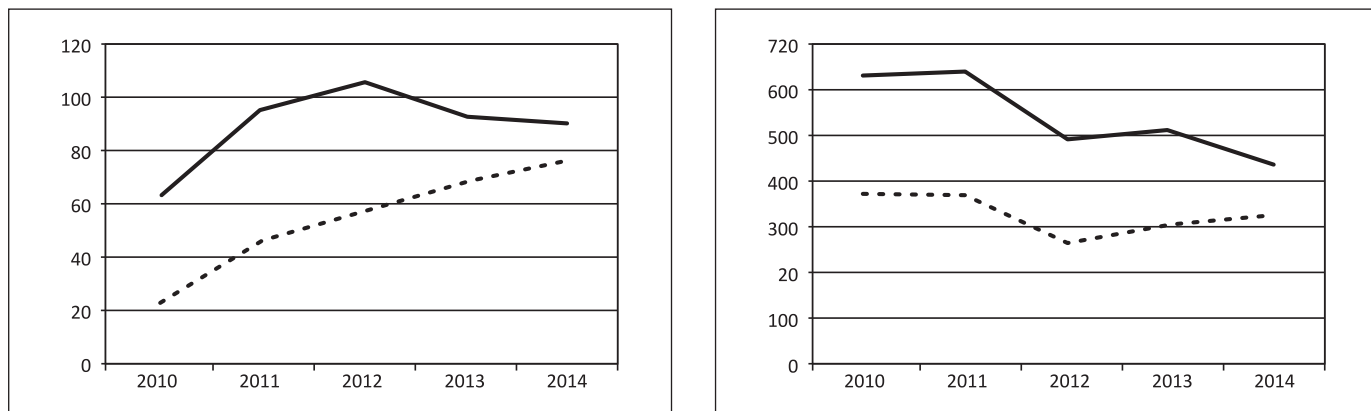


Figure 2 Number of all applicants (deck – —, engine – ..... ) in Zadar (left) and Rijeka (right)

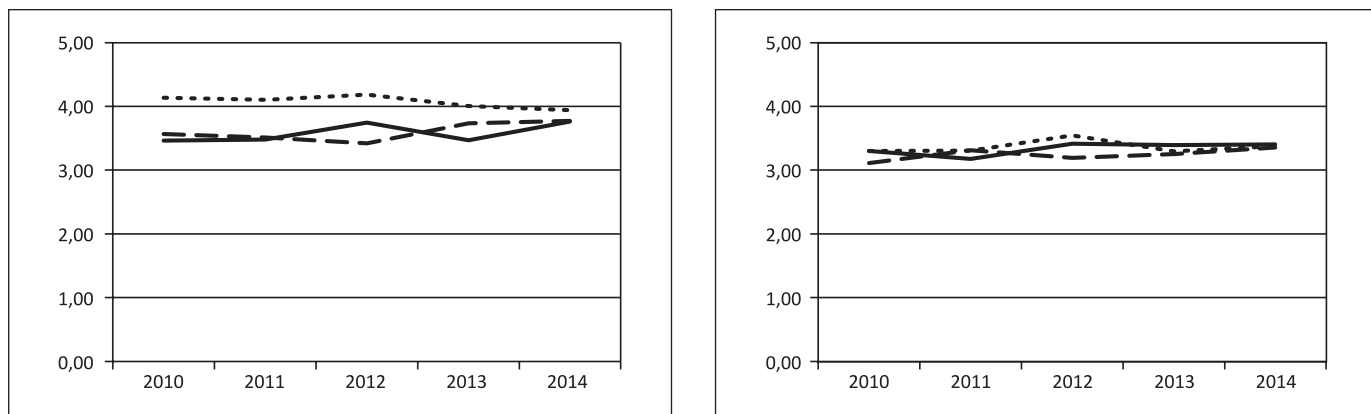


Figure 3 Average marks of applicants coming from different schools (maritime schools – ..... , grammar schools – — and other schools – - - -) and applying for deck department in Zadar (left) and engine department in Rijeka (right)

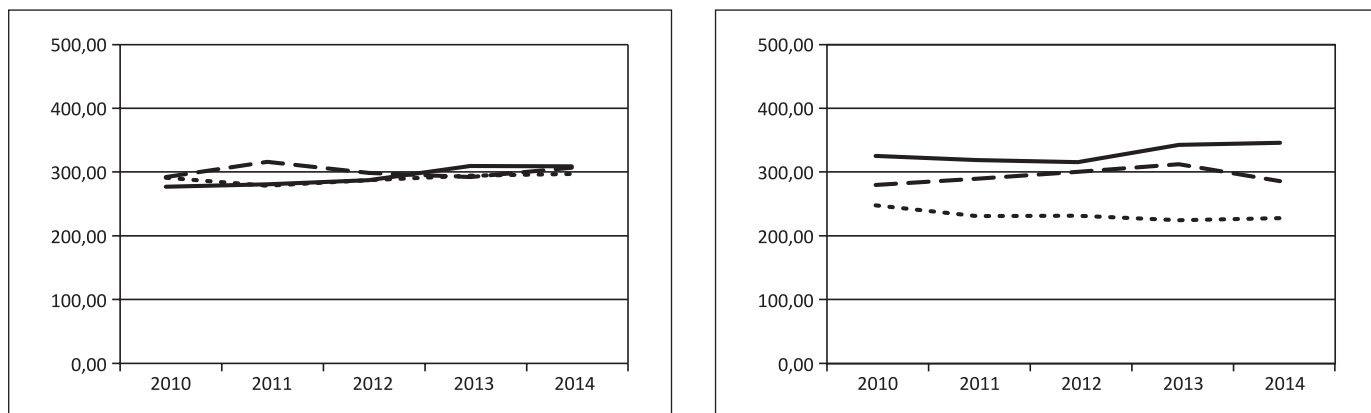
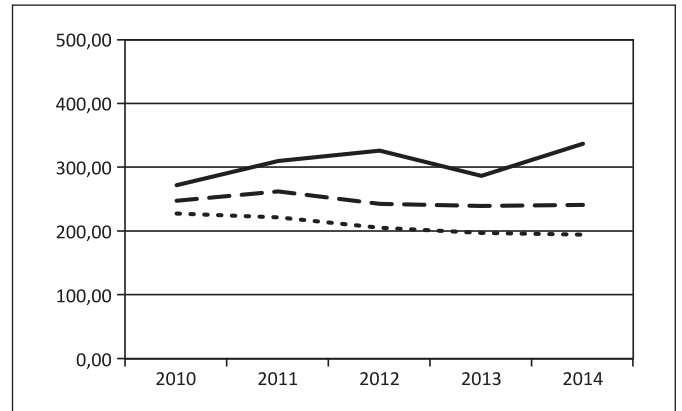
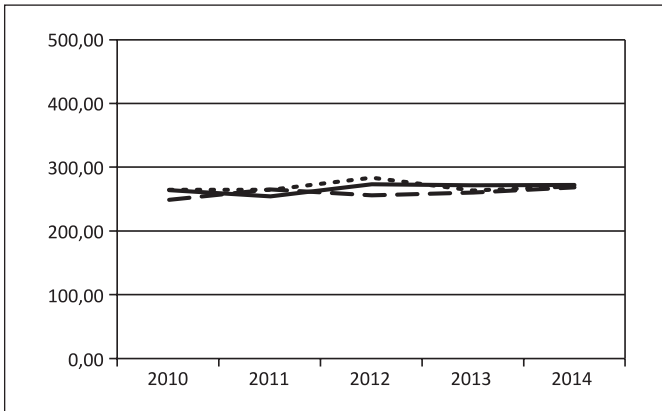
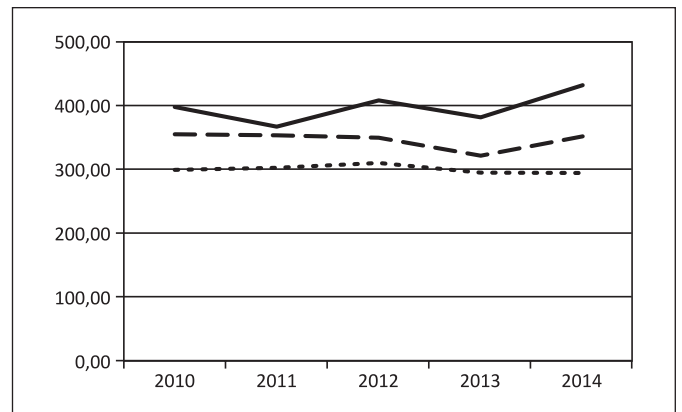
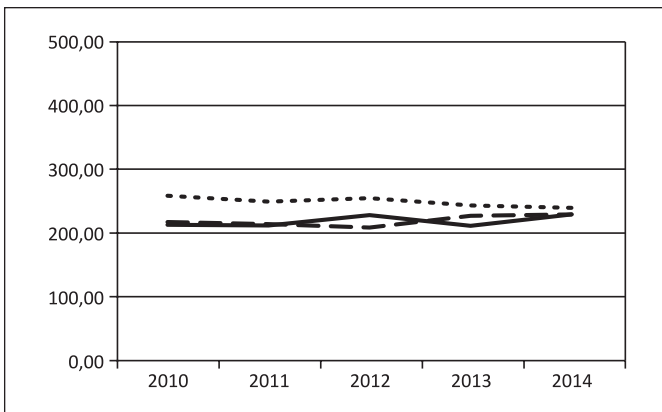


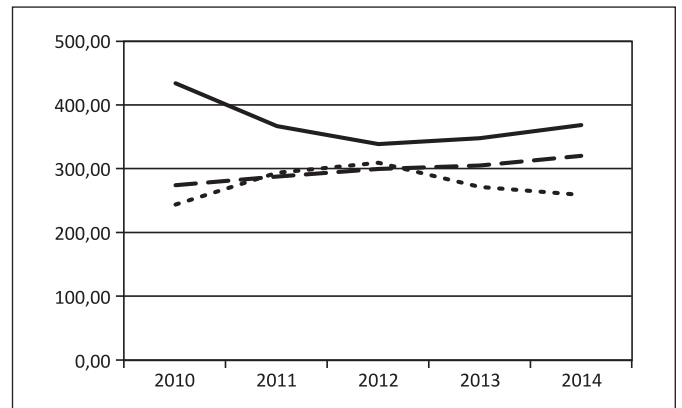
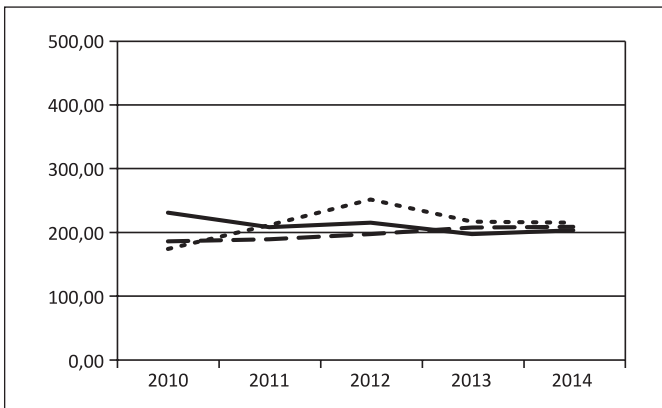
Figure 4 Marks received by deck department applicants in Rijeka during secondary education (left) and at school-leaving examination (right) for applicants from maritime schools (.....), grammar schools (—) and other schools (- - -)



**Figure 5** Marks received by engine department applicants in Rijeka during secondary education (left) and at school-leaving examination (right) for applicants from maritime schools (.....), grammar schools (—) and other schools (- - -)



**Figure 6** Marks received by deck department applicants in Zadar during secondary education (left) and at school-leaving examination (right) for applicants from maritime schools (.....), grammar schools (—) and other schools (- - -)



**Figure 7** Marks received by engine department applicants in Zadar during secondary education (left) and at school-leaving examination (right) for applicants from maritime schools (.....), grammar schools (—) and other schools (- - -)

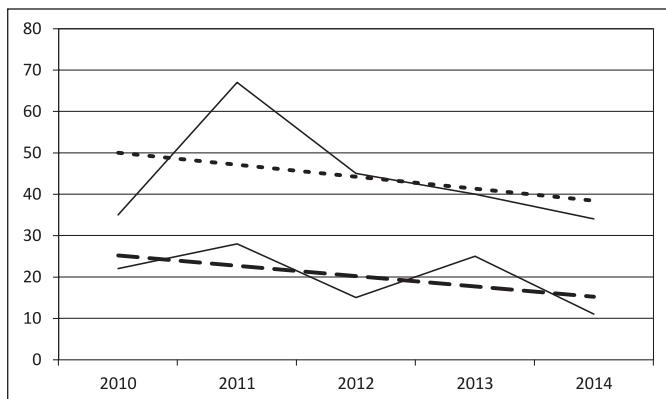
The collected data show also a significant difference in marks obtained by different school groups. In general, applicants for deck department have better marks than those applying for engine department. Furthermore, applicants who graduated from secondary schools within the Zadar region generally have better marks than those who graduated in Rijeka.

These discrepancies are not easy to explain. Taking into account that study programmes in secondary schools are quite similar or even the same (in case of secondary maritime schools), these discrepancies most probably relate to cultural differences and different local social environment.

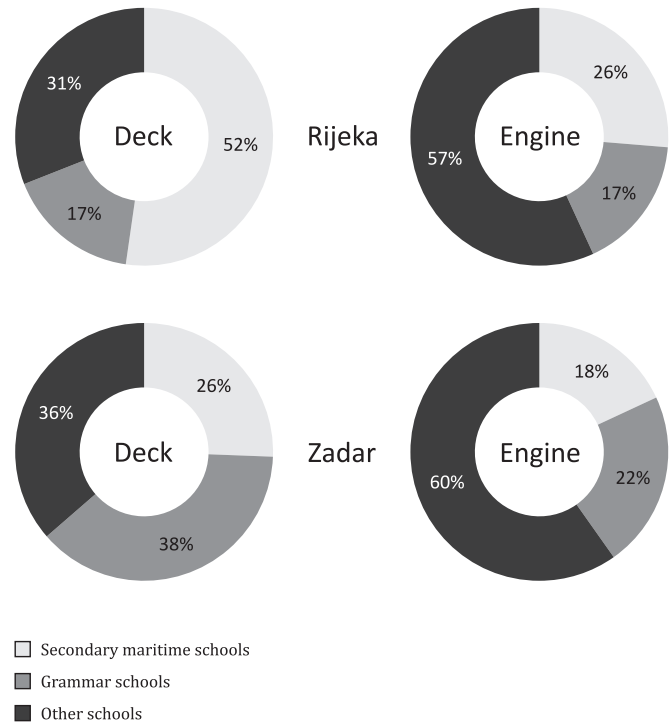
Another important difference is the difference between marks obtained during the secondary education and marks received at the national school-leaving examination level<sup>7</sup> where all secondary-school leavers have to answer the same questions.<sup>8</sup>

The above-mentioned data clearly reveal that applicants from grammar schools, although they have obtained very similar results from secondary education as their colleagues from other schools, receive significantly better marks at school-leaving examination. In several cases the difference is more than 40%. This clearly proves a general belief that applicants from grammar schools are better educated in subjects required on the national school-leaving examination level than their colleagues from other schools (either because more talented children choose grammar schools or because a better education process is offered or because both of them).

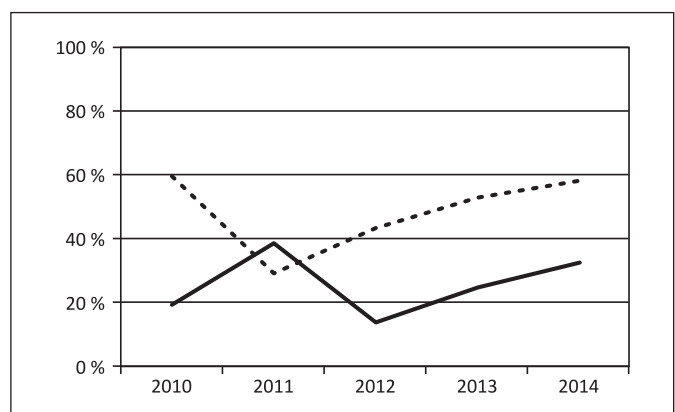
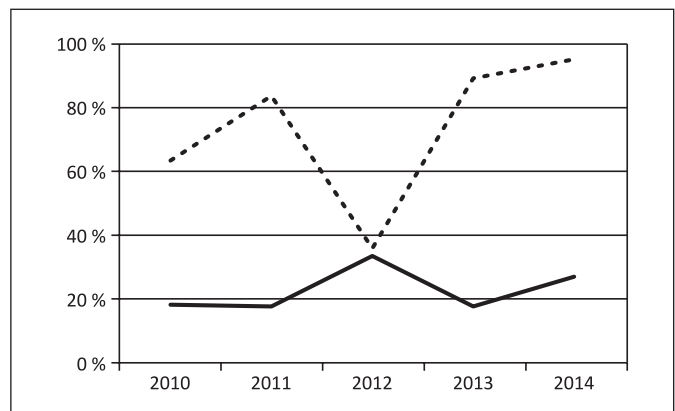
The number of enrolled students from secondary maritime schools is gradually decreasing in Rijeka. In Zadar, the number of students who graduated from maritime schools slowly replaces students from other secondary schools.



**Figure 8** Number of secondary maritime school graduates who have successfully enrolled at deck (.....) and engine (- - -) department study programmes in Rijeka



**Figure 9** Five-year average ratio of students who have graduated from secondary maritime schools, grammar schools and other schools



**Figure 10** Ratio between enrolled and graduated students from deck (.....) and engine (—) departments in Zadar (up) and Rijeka (down)

<sup>7</sup> Examination in Mathematics, English and Croatian.

<sup>8</sup> Almost all applicants at higher MET institutions apply for a B-level examination, being less demanding than the A-level ones.

These changes may be related to the introduction of a Special Education Programme for Seafarers. It should be pointed out that more students from secondary maritime schools are choosing to continue their careers on board ships and later on to attend a Special Educational Programme. Such career path is much more lucrative for a seafarer. However, in order to prove this statement, it is necessary to carry out further researches on high school students' motivation.

The five-year average ratio of students, as regards their previous education, reveal that only a little more than half students applying for the deck department in Rijeka are those who graduated from secondary maritime schools (although their number is slowly decreasing). In all other cases, the majority of students are those who graduated from non-maritime schools. This is obvious for the engine department as well, where in Zadar only 18% of students graduated from maritime schools while in Rijeka it makes only 26%. From the programme standpoint it means that the curricula have to be designed for students with no previous maritime knowledge or experience. The ratio of students who graduated from grammar schools is very similar for both programmes in Rijeka, but is significantly different for programmes in Zadar, where the majority of students choose deck officers' programmes. Every third student in Zadar who has graduated from the engine department at a maritime secondary school continues education at the university level.

The overall graduation rates<sup>9</sup> at deck and engine departments are quite low. As for Rijeka, the five-year average is only 48% for the deck department and 24% for the engine department. The numbers referring to Zadar are quite different: 75% for the deck department and 23% for the engine department. A much higher ratio of deck department students in Zadar may be explained by the fact that these students have graduated from grammar schools. However, there is no proof that such relation exists, particularly because there was a significant drop in 2012 with no apparent explanation.

#### 4 Discussions and conclusions

Recent trends in maritime education in Croatia with particular references to enrolment and graduation processes at higher Maritime Education and Training (MET) institutions were most probably caused by economic

crisis in 2009. The results of the research have shown that, in the last five years, graduates from grammar schools and other four-year vocational schools have increasingly chosen seafaring as their profession. The average ratio for students of the deck department, based on the previously acquired education, reveals that only 52% of the students in Rijeka and 26% in Zadar graduated from maritime schools. This is even more evident for engine departments, where only 18% of the students in Zadar and 26% of those in Rijeka graduated from maritime schools. Considering that the majority of applicants have no maritime background, it is quite incredible how many have no intention at all to become deck officers or marine engineers on board ships.

Significant changes in the structure of the students may also be related to the introduction of a Special Education Programme for Seafarers because of a more lucrative career path for a seafarer. In order to prove this statement, it is necessary to carry out further researches on high school students' motivation.

Students who graduated from grammar school are much better prepared for general subjects required at the national school-leaving examination level, where they obtain much better results. However, the ratio of these successfully secondary-school graduates is slightly lower than the number of the applicants who successfully enrolled. The overall graduation rates are low, indicating a quite high drop-out rate. It goes to as low as 12% (in 2012, 9 were secondary-school graduates and 74 students were enrolled). This is especially true for engine department programmes. Such high drop-out rates definitely require further researches regarding students' intrinsic motivation and possible changes of the curricula.

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<sup>9</sup> Graduation rate is a rate of graduated students compared to number of enrolled at the same program in the same year. It should not be confused with drop-out rate i.e. the number of students who actually graduate within given time (three years for undergraduate study programs).