

Current trends in the maritime profession and their implications for the maritime education

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Abstract: The paper presents the current trends in the seafaring profession and their educational dimensions. The initial thesis is that different maritime specialists perceive and interpret trends in different perspectives. The study presents an overview of trends in the maritime professional sphere in order to classify them regarding their origin and possible consequences. The research includes a survey on already formulated trends, causes and consequences. Based on the empirical research the results are analyzed in order to define which trends and areas are characterized by more consensus and which trends and processes are characterized by differences in the opinions of the evaluated target groups. The study provides recommendations for adapting the maritime education to the current trends.

Keywords: maritime education, trend survey, transformation processes, optimization

1. Aim of the study and methodology.

The **aim** of this study is to identify current trends and motivations in the maritime profession, such as working onboard a ship as well as working in a shipping company, and the differences in these trends depending on the working experience of the respondents.

1.1. Survey respondents

The survey includes 132 participants who live in Bulgaria between 25 and 40 years old. Of these, 57 work on a ship (as a crew in a shipping company or on a Navy ship) and the rest are engaged in maritime jobs on the shore or in academic institution (Fig.1 and Fig.2). 123 respondents state that they know the trends in the maritime profession well and very well, and the rest believe they know them poorly according their work experience (Fig.3).

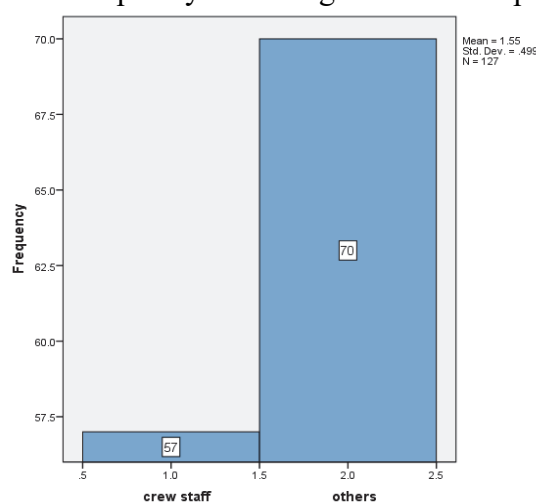


Fig.1. Job occupation

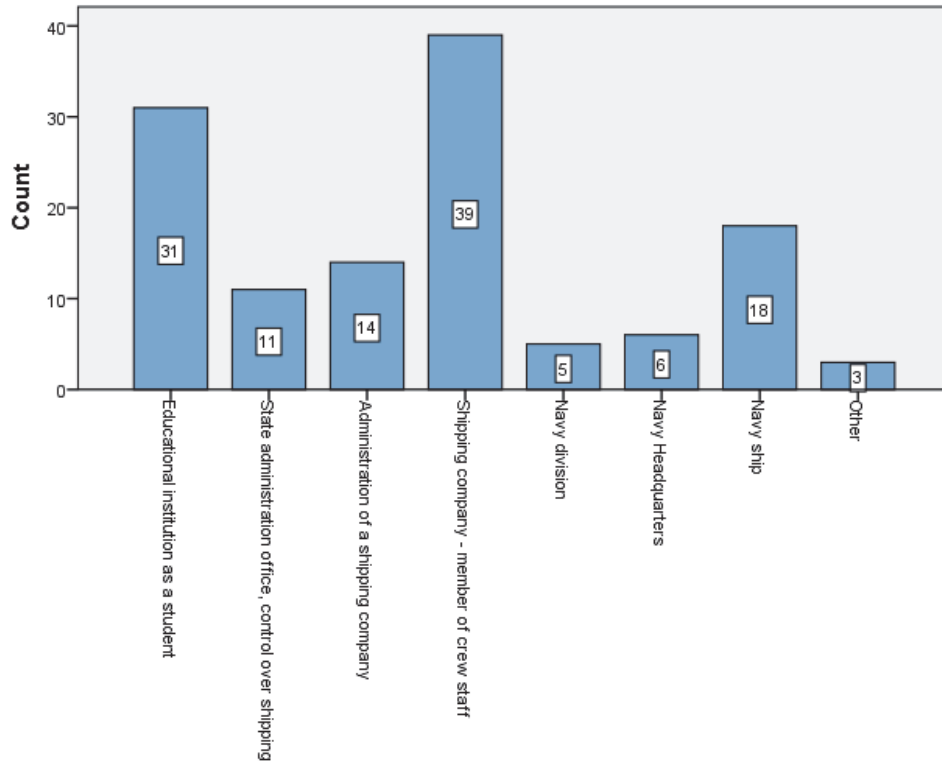


Fig.2. Job position

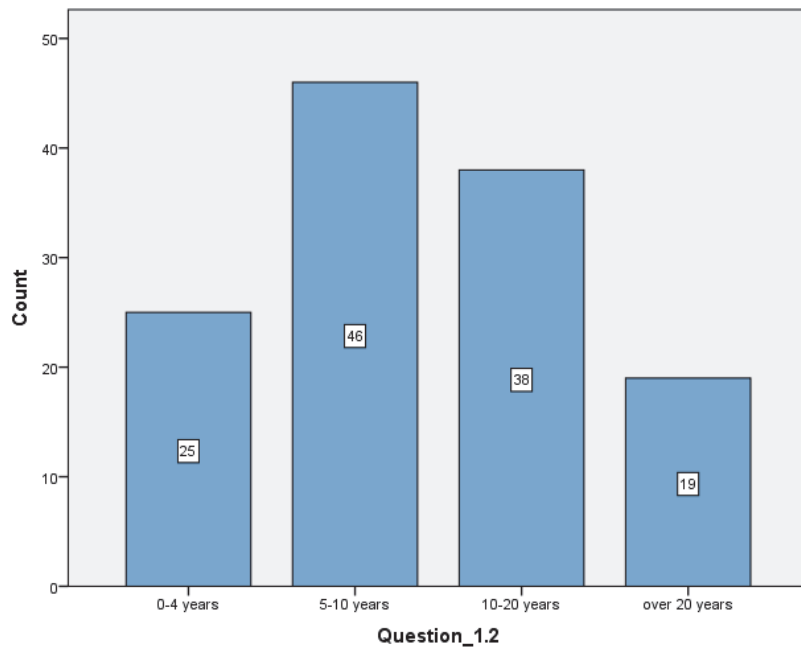


Fig.3. Job experience

Respondents answered to five sociodemographic questions, to 22 questions studying the trends in the seafaring professions according to the Likert 5-point scale, and 5 questions according to the Likert's 5-point scale related to ship's motivations for work. The data were collected during the first six months of 2019. The anonymity of the surveyed persons is preserved.

2.2. Study design and conduct

In order to research whether the 22 questions from the scale of trends in different maritime occupations for ship work formed a reliable scale [1], the Cronbach coefficient alpha was measured. The reliability of the trend scale is $\alpha = 0.855$ for the entire sample $N = 132$. In statistics, it is assumed that the Cronbach alpha α ratio greater than 0.7 is reliable. Therefore, the presented questionnaire is reliable for the surveyed sample.

In studying whether the five issues related to changes in motivation of the seafaring profession onboard a ship form a reliable scale, the Cronbach's coefficient alpha is $\alpha = 0.796$ for the entire sample $N = 132$, ie. The scale that explores the motivation is reliable.

In order to check the constructive validity of the two scales for the analyzed sample, a confirmatory factorial analysis of the issues related to trends in the seafaring profession and questions concerning the motivation of the maritime professions was carried out. The data were analyzed by the Varimax (Varimax) rotation method with Kaiser normalization.

The survey also explores the change in motives for practicing maritime jobs onboard a ship. The main factors motivating the work are investigated:

1. Financial motivation;
2. Good career perspectives;
3. Opportunity to visit foreign countries;
4. Motivation stemming from the "passion and romance of the sea";
5. Prestige of the profession in society.

In order to verify the hypothesis that the arithmetic value of the responses to the trend survey [2] for the two groups: onboard and offshore is equal, independent-samples t-test of Student and one-factor ANOVA dispersion analysis were carried out.

The study consists of two scales that analyze the trends and motivations in the maritime professions onboard a ship and on the shore. In the course of its conduct the differences in the attitudes of respondents to the questions depend on the maritime profession they exercise and the period in which they have the impression and experience of the seafaring profession.

On the basis of the conducted statistical study, the following main trends were highlighted using Varimax's rotation method with Kaiser normalization:

1. *Increased development and implementation of information technology.*
2. *Leadership and team management skills.*
3. *Diversity management skills and project development know-how.*
4. *Standardization of the seafaring profession and related qualification training.*
5. *Administrative, economic, legal know-how and stratification of the maritime profession.*
6. *Integration of the maritime transport and involvement of specialists with different „not maritime” education.*
7. *Image decrease of the maritime profession in the well-developed countries and remote management of the activities from the shore.*

The obtained results show that the applied methodology for determining the trends in the seafaring profession is reliable and constructively valid for the given sample. This allows further statistical analysis.

2. Results

2.1. Results of the comparative study analysis of **trends** in the maritime occupations onboard a ship and onshore.

With regard to **Trend 1 „Increased development and implementation of information technology”** it was found that there was no statistically significant difference between the arithmetic mean values for ship’s occupations ($M = 4.42$, $SD = 0.865$) and onshore occupations ($M = 4.29$, $SD = 0.806$), $t(124) = 0.88$, $p = 0.892$. The magnitude of the difference in the arithmetic mean ($d = 0.156$) is less than the typical magnitude of the effect, according to Cohen [3]. Both groups of respondents consider that IT skills take an increasingly important role in maritime professions (Fig.4). The weak difference between the two groups of respondents leads to the conclusion that all have already realized the need to use modern information technologies, both in the maritime professions onshore and for the ship occupations.

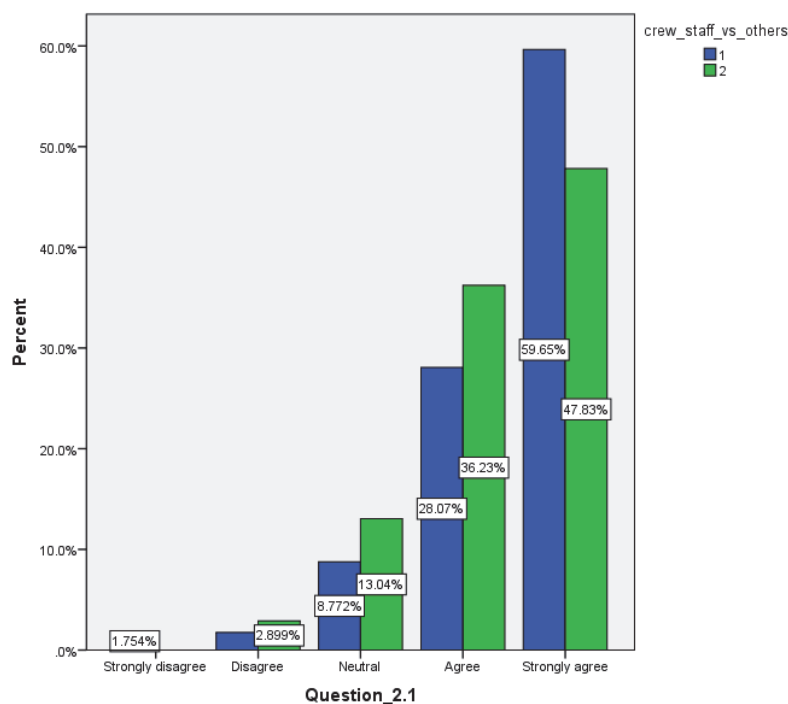


Fig.4. Trend 1 answers of crew staff and others

In the one-factor analysis of the issues related to **Trend 2 „Leadership and team management skills”**, no statistically significant difference was found in the answers to the questions. Both groups – working on a ship ($M = 4.61$, $SD = 0.648$) and on the shore ($M = 4.60$, $SD = 0.602$) are on the same opinion that teamwork is increasingly important in the seafaring profession. The requirement to have leadership skills at the present stage also increases, according to the two groups surveyed, for the occupation on a ship ($M = 4.54$, $SD = 0.683$), and on the shore – ($M = 4.31$, $SD = 0.778$). Small-team management skills have also been reported to have been rising recently for shipboard naval professions ($M = 4.51$, $SD = 0.658$) and on shore – ($M = 4.43$, $SD = 0.719$). Respondents believe that the development of maritime transport is becoming more and more important in solving complex problems for shipboard occupations ($M = 4.58$, $SD = 0.755$) and on shore – ($M = 4.50$, $SD = 0.680$). They consider that communication skills in maritime professions are increasingly important – for the naval

professions on a ship ($M = 4.44$, $SD = 0.780$) and on the shore – ($M = 4.44$, $SD = 0.799$). Nowadays, it is recognized that the role of the human factor is increasing. This fact requires from the relevant academic institutions to train staff with leadership skills, good communication and teamwork skills.

One-factor analysis of **Trend 3 issues „Diversity management skills and project development know-how”** did not provide a statistically significant difference in respondents' answers. They consider that there is a growing need to have the skills to handle cultural diversity – for maritime personnel on a ship ($M = 4.00$, $SD = 0.991$), and on shore – ($M = 4.23$, $SD = 0.843$). In the context of increasing numbers of women who have chosen maritime professions, according to respondents, there is a growing need for skills to deal with gender differences ($M = 3.64$, $SD = 1.135$) and on shore ($M = 3.71$, $SD = 1.177$). They report that there is a growing need for critical thinking among all maritime professions – for shipboard naval professions ($M = 4.43$, $SD = 0.710$) and on shore – ($M = 4.28$, $SD = 0.899$).

The survey shows neutral opinion about the need for project management skills both for onboard personnel ($M = 3.43$, $SD = 1.059$), and on the shore – ($M = 3.30$, $SD = 0.960$). An increasing number of ship crew and onshore companies are required to work in a multicultural environment, which creates communication challenges. It is inevitable that conflicts and specific problematic issues may arise in an working environment with cultural diversity. The increasing number of women in the maritime professions requires training and additional gender management skills as well. It is a fact that crews consist for the most part of different nationalities, religions and gender. The need for diversity tolerance is recognized by almost all respondents.

The one-factor analysis of **Trend 4 „Standardization of the Seafaring Profession and Related Qualification Training”** also did not show a statistically significant difference in the responses of the surveyed groups. Naval staff on a ship ($M = 4.14$, $SD = 1.034$) and on the shore ($M = 4.34$, $SD = 0.683$) believe that the dynamics of technical development and the standardization of professional requirements increasingly require courses to update training. The two groups of respondents consider that the standardization of the profession is increasing in the modern times – for the naval professions on a ship ($M = 3.71$, $SD = 1.004$) and on the shore – ($M = 3.72$, $SD = 0.774$). The maritime professions follow the dynamics of the technical development of maritime transport and there is no doubt that it is necessary to attend courses to update professional knowledge.

The analysis of **Trend 5 „Administrative, economic, legal know-how and stratification of the maritime profession”** again did not show a statistically significant difference in respondents' answers. They consider that administrative activities occupy an increasing part of working time for the staff on a ship ($M = 4.45$, $SD = 0.592$), and on the shore – ($M = 4.29$, $SD = 0.799$). The growing need for economic knowledge of commercial processes has also been reported by all surveyed practitioners onboard ($M = 3.63$, $SD = 0.885$) and on shore – ($M = 3.46$, $SD = 0.919$). The two groups of respondents agree that at the present stage the legal knowledge is increasingly important for the ship's naval professions ($M = 3.63$, $SD = 1.071$) and on the shore – ($M = 3.64$, $SD = 1.017$).

Onboard ($M = 3.00$, $SD = 1.307$) and shore personnel ($M = 2.94$, $SD = 1.299$) expressed a neutral view of the statement that seafaring is highly segmented and new jobs occur in addition to traditional ones. Neutral opinion is given by the respondents from the two groups

also regarding the claim that there is a „stratification” of the seafaring professions – for the maritime professions on a ship ($M = 3.25$, $SD = 1.148$), and on the shore – ($M = 3.14$, $SD = 1.149$). In the current transport developments, it is increasingly necessary for maritime professionals to have broad knowledge in the area of economics, administrative activities and law. Respondents believe that maritime professions should have the necessary training to cope with these new requirements that are being currently imposed on them. The survey showed that there is no need for opening new positions or maritime professions, and that qualified seafarers need to acquire the necessary knowledge in these fields during their education.

The one-factor analysis of respondents’ answers to questions related to **Trend 6 „Integration of maritime transport and involvement of specialists with different „non maritime” education”** showed no statistically significant difference. They expressed a neutral view of the assumption that in the maritime business staff with non-maritime education is increasing – for seafaring naval professions ($M = 2.91$, $SD = 1.299$) and on shore – ($M = 3.09$, $SD = 1.276$). This is also their opinion with regard to the statement that transport is getting more and more integrated and the segregation of maritime and other kinds of transport is diminishing – for shipboard naval professions ($M = 2.82$, $SD = 1.136$) and on shore – ($M = 3.06$, $SD = 1.113$). The respondents do not appreciate the existence of this trend in the development of maritime transport.

No statistically significant difference was found for the two surveyed groups in the answers to the questions related to **Trend 7 „Image decrease of the maritime profession in the well-developed countries and remote control of maritime operations”**. They consider that the prestige of seafaring professions is declining in developed economies – for the naval professions on a ship ($M = 3.55$, $SD = 1.292$), and on the coast – ($M = 3.55$, $SD = 1.388$). Respondents from both groups expressed a neutral opinion regarding the statement that an increasing number of management and maintenance processes and control of technical parameters are carried out remotely from the shore – for the maritime staff on a ship ($M = 2.79$, $SD = 1.155$), and on shore – ($M = 3.16$, $SD = 1.134$).

The trend survey among ship and onshore professionals showed that the two groups of respondents had no differences in terms of the considered trends.

2.2. Results of the comparative study analysis study of the trends in the maritime professions according to the time of **working experience**.

A one-factor analysis of the trends in the maritime profession for staff on a ship is carried out for three groups according to their experience in the seafaring profession. The first group has an experience of 0 to 4 years. It mainly includes students. The second group has an working experience of 5 to 10 years and the third is with experience of more than 10 years.

In the analysis of **Trend 1 „Increased development and implementation of information technology”**, a statistically significant difference was not found between the three groups – for the first group ($M = 4.35$, $SD = 0.847$), for the second group ($M = 4.38$, $SD = 0.871$), and for the third one – ($M = 4.23$, $SD = 0.297$), $F(2,113) = 0.136$, $p = 0.873 > 0.05$. All respondents, regardless of their working experience, believe that the use of modern information technology is necessary, both in the maritime professions onshore and onboard the ship.

A one-factor analysis of the issues related to **Trend 2 „Leadership and team management skills”** found a statistically significant difference in respondents from the three groups on the need for leadership skills $F(2,112) = 3,442$, $p = 0.035 < 0.05$. The magnitude of

the effect $n = 0.24$, which is calculated using the coefficient e , is average or typical, according to the interpretation made by Cohen [3]. A Tukey HDS post-hoc test was used to show that the arithmetic mean for the third group ($M = 3.92$, $SD = 0.76$) was statistically significantly different from the arithmetic mean of the first group ($M = 4.49$, $SD = 0.697$) ($M = 4.47$, $SD = 0.671$).

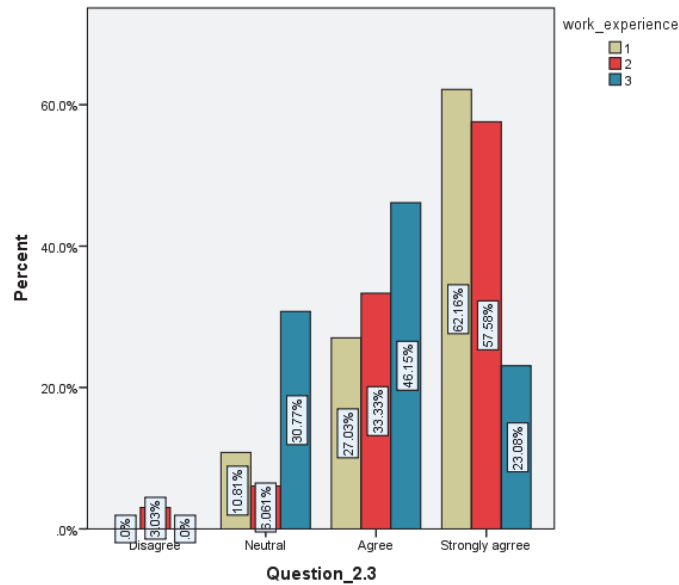


Fig.5. Trend 2 answers according work experience

This fact has a logical explanation because the third group includes maritime personnel with more than 10 years of experience who hold management positions and definitely understand and practice leadership skills. The first two groups have only indirect observations on the question. For this reason, it was statistically confirmed that there is no difference in their attitude on this issue (Fig.5).

After analyzing the answers to questions related to **Trend 3 „Diversity management skills and project development know-how”** there were no statistically significant differences for the three groups.

In analyzing the answers to the questions of the respondents concerning **Trend 4 „Standardization of the seafaring profession and related qualification training”**, a statistically significant difference was found between the three groups regarding the need to attend qualification courses for training update $F(2,111) = 3,870$, $p = 0.024 < 0.05$. The magnitude of the effect $n = 0.255$, which is calculated using the coefficient e , is average or typical, according to the interpretation made by Cohen [3]. A Tukey HDS post-hoc test was used to show that the arithmetic mean for the third group ($M = 3.62$, $SD = 1.121$) was statistically significantly different from the arithmetic mean of the first group ($M = 4.29$, $SD = 0.801$) ($M = 4.35$, $SD = 0.839$).

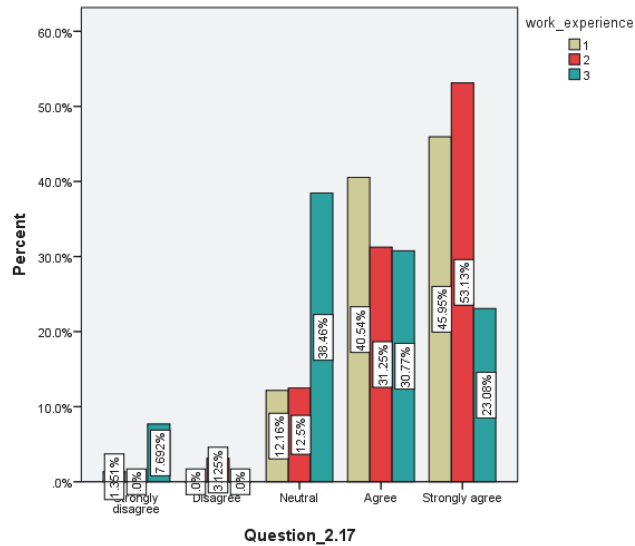


Fig.6. Trend 4 answers according work experience

The results can be interpreted in two assumptions.

- Respondents with more than 10 years of experience believe they have attended enough such courses and have gained practical experience and therefore the need to update their training decreases (Fig.6).
- The reason for the differences with regard to this issue can be found in the frequency of conducting qualification courses and the higher requirements of the experienced people regarding the quality of the conducted courses.

The one-factor analysis of **Trend 5 „Administrative, economic, legal know-how and stratification of the maritime profession”** showed no statistically significant difference in respondents from the three groups, but the PostHocTests test showed a statistically significant difference between the second (M = 3.23, SD = 1.309) and the third group (M = 2.38, SD = 0.870) according to the Games-Howell test in addition to the traditional $F(2,110) = 2.033, p = 0.136$.

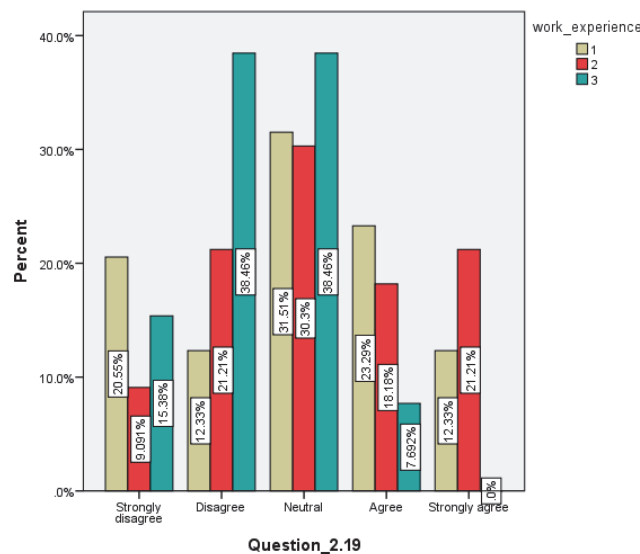


Fig.7. Trend 5 answers according work experience

Respondents from the third group, with more than 10 years experience in the profession, do not accept the segregation of the seafaring profession, while the second group for the most part express a neutral opinion (Fig.7). This fact can be explained by skepticism and routine accumulations of experienced maritime personnel in terms of the current changes that take place in the maritime profession and the developments in this business.

After analyzing the responses to the questions related to **Trend 6 „Integration of maritime transport and involvement of specialists with different „non maritime” education”**, there were no statistically significant differences for the three groups.

In analyzing the responses to the questions of the respondents on **Trend 7 „Image decrease of the maritime profession in the well-developed countries and remote control of maritime operations”** a statistically significant difference between the arithmetic mean values of the three groups’ responses was found regarding the views that the prestige of the maritime professions declined in the developed economies $F(2,112) = 0.632, p = 0.003 < 0.05$. The magnitude of the effect $\eta = 0.106$, which is calculated using the coefficient e , is less than the typical, according to the interpretation made by Cohen [3]. For the first group ($M = 3.56, SD = 1.281$), for the second one – ($M = 3.44, SD = 1.523$), and for the third group ($M = 3.92, SD = 0.862$). The third group stated more convinced than the first one, while the second group has a rather neutral opinion (Fig.8).

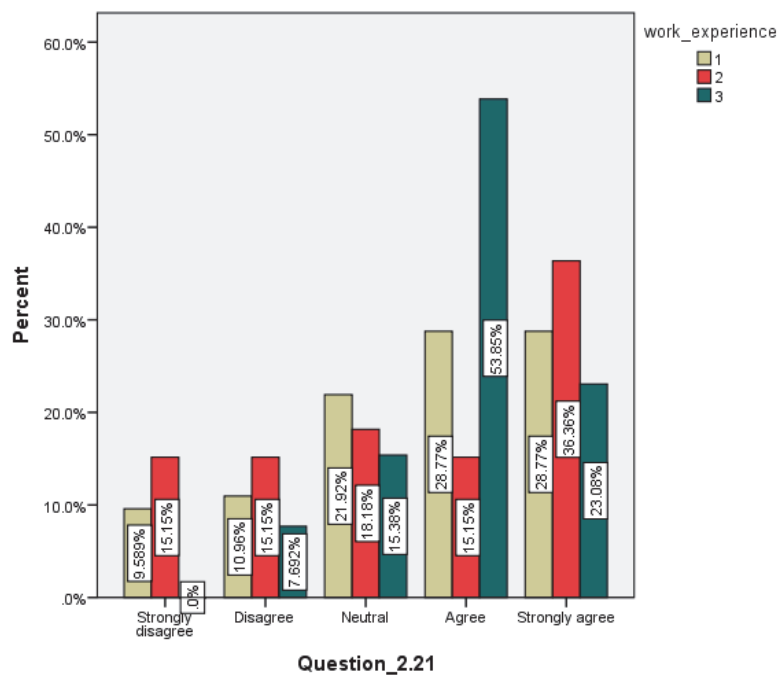


Fig. 8. Trend 7 answers according work experience

2.3. Results of the comparative analysis of the study of **motivations** in the onboard maritime occupations for both onboard and on shore personnel.

A statistically significant difference was found, $F(1,116) = 0,307, p = 0,024 < 0,05$ for the answers to the question of **Motivation 1 "Financial motivation"** for onboard and onshore personnel. The majority of onboard staff ($M = 3.45, SD = 1.564$) expressed a neutral opinion on this issue, while onshore personnel ($M = 3.60, SD = 1.321$) considered that financial

motivation was important for occupation onboard a ship. The magnitude of the effect $\eta = 0.051$, which was calculated using the coefficient *ema* is less than the average or less than the typical Cohen interpretation [3].

Difference was seen in onboard and onshore personnel' responses to **Motivation 2 "Good career perspectives"** -F (1,116) = 0.289, $p = 0.029 < 0.05$. Onboard staff (M = 3.36, SD = 1.331) expressed a neutral opinion on this issue, while onshore personnel (M = 3.85, SD = 1.062) agree that this is important for choosing the seafaring profession. The magnitude of the effect $\eta = 0.05$, which is calculated using the coefficient *ema*, is small or less than the typical Cohen interpretation [3].

The statistics made on the responses to **Motivation 3 "Opportunity to visit foreign countries"** showed differences in onboard and onshore-working place based opinions - F (1,116) = 1,854, $p = 0,012 < 0,05$. The ship staff (M = 2.58, SD = 1.42) believe that the opportunity to visit foreign countries for the most part does not affect their motivation them while onshore personnel (M = 2.91, SD = 1.155) has different opinion on this issue. The magnitude of the effect $n = 0.125$, which is calculated using the coefficient *ema*, is small or less than the typical Cohen interpretation [3].

In the analysis of **Motivation 4 "Motivation stemming from the" passion and romance of the sea"** there was no statistically significant difference between the responses of onboard (M = 1.89, SD = 1.103) and onshore personnel (M = 2.22, SD = 1.281), F (1,116) = 2.173, $p = 0.154 > 0.05$. Both groups do not accept that love for the sea can motivate a person to choose a seafaring profession onboard a ship.

Concerning **Motivation 5 "Prestige of the profession in society"**, there was also no statistically significant difference in the responses of onboard (M = 2.49, SD = 1.325) and onshore staff (M = 2.54, SD = 1.292) 1.116) = 0.154, $p = 0.701 > 0.05$. Ship and onshore personnel rather believe that the seafaring profession onboard a ship is not sufficiently prestigious in society to motivate young people to choose it.

2.4. Results of the study comparative analysis of **motivations** of the onboard seafaring professions of a ship according to the working experience of the respondents

The one-factor analysis of **Motivation 1 "Financial motivation"** did not show a statistically significant difference between the responses of the three groups according to their years of experience. For the first group (M = 3.60, SD = 1.426), for the second - (M = 3.25, SD = 1.602), and the third group (M=3.92, SD=1.379)F(2,105)=1.002, $p=0.326 > 0.05$. The three groups do not think that enough financial motivation can influence the choice of an occupation onboard a ship.

In the analysis of **Motivation 2 "Good career perspectives"**, there was also no statistically significant difference in the responses of the three groups. For the first group (M = 3.53, SD = 1.165), for the second one (M = 3.11, SD = 1.315) and for the third one (M=3.25,SD=0.965)F(2,105)=1.348, $p=0.403 > 0.05$. The three groups expressed a neutral view of the fact that „climbing the ladder” could be a motive for choosing a seafaring profession.

No statistically significant difference was found in the one-factor analysis of **Motivation 3 "Opportunity to visit foreign countries"** for the three groups. For the first group (M = 2.87, SD = 1.292), for the second one - (M = 2.54, SD = 1.29) and for the third (M=2.58,SD=1.311)F(2,105)=0.765, $p=0.978 > 0.05$. The three groups did not consider the

opportunity of visiting foreign countries motivating enough for the choice of a seafaring profession onboard a ship.

Statistically significant difference was found in the one-factor analysis of **Motivation 4 "Motivation stemming from the" passion and romance of the sea"** for the three groups. For the first group ($M = 1.94$, $SD = 1.105$), for the second one ($M = 2.32$, $SD = 1.492$) and for the third group $M = 1.92$, $SD = 0.9$, $F(2,105) < 0.05$. The magnitude of the effect $\eta = 0.14$, which is calculated using the coefficient *ema*, is less than the typical, according to the interpretation made by Cohen (Cohen, 1988). The first and third group of respondents are convinced that passion for the sea can not serve as a motivation for choosing an onboard occupation, while the second group is less of the same opinion.

For the **Motivation 5 "Prestige of the profession in the society"** in the one-factor analysis no statistically significant difference in the answers of the three groups of respondents was found. For the first group ($M = 2.66$, $SD = 1.253$), for the second one ($M = 2.29$, $SD = 1.436$) and for the third ($M = 2.33$, $SD = 0.985$) $F(2,105) = 1.014$, $p = 0.189 > 0.05$. The three groups do not agree that the prestige of the seafaring profession in society motivates the choice of an onboard position.

3. Summary of the results and conclusion

The maritime industry is changing very fast. The great challenges facing the seafaring professions and the outflow of them especially in the well-developed countries require research and analyzes of the current trends during their development. Research results outline the most important of them. The scales used to measure the attitudes of respondents find their reflection in the factors that build up the factorial analysis. The results show that for the most part the participants confirmed the validity of the previously outlined trends.

Regarding the seven trends the research confirms their validity with a slightly new aspects, f.ex. the need for obtaining more knowledge of experienced personnel in the project management that is closely connected with the new economic reality in the maritime business. This is once again confirmed by the neutral view of the respondents to new economic processes like „stratification” of the profession, increase of non-maritime educated personnel, transport integration, remote management and control of operations etc. Neutral answers mean in the most cases lack of enough information about the asked trend. It can be assumed that a debate on understanding the overall economic framework of the processes is definitely needed.

Regarding the factor analyses one factor seem to be leading for the formation of ones understanding of the asked processes - the age and the respective length of working experience. This means that routine accumulations can change the perception and the acceptance of some new tendencies. In some cases we can divide maritime personnel in the so called „old school” and new one.

Differences are confirmed between onboard and onshore personnel regarding the motivation for choosing an onboard position. Onshore personnel are more active in commenting career and financial perspectives whereas onboard personnel show more neutralness. Both groups do not accept that „love for the sea” can motivate a person to choose a seafaring profession onboard a ship as well as both groups agree that the prestige of the profession decreases. There is a kind of an „abstinent” perception of the profession with a slightly difference in the age of experience between 5 and 10 years.

To conclude, recommendations can be developed in the direction of changing training models. At least several directions seem to be correct based on the conducted statistical research. First of all, it seems reasonable to emphasize the preparation of so-called „soft skills“. Obviously, in general this training has been neglected in previous practice. Next, the training for an active work in advanced informational product environment should be enhanced, focusing on software packages use skills.

Last but not least, it is appropriate to bring the following idea to discussion. As a result of the dynamics of technology development, new technical means should be expected to become more rapid. This will inevitably lead to a decrease of staff competence to work with specific technical systems. Obvious we will face the need for additional skills. First of all, this is to build a long life learning system for seafarers to regularly update their competencies.

Another aspect is the necessity for these specialists to have the skills to learn and to train. This approach should be specifically emphasised during the whole process of the training of maritime specialists. In this context we can study, suggest, apply and test the implementation of some principles from the adult learning theories (Alexander Kapp, Eugen Rosenstock-Huessy, Shepherd Knowles, etc.), to change the learner's attitudes in teaching the mentioned topics and to include reasonable aspects of the transformative learning in the teaching methods.

The results of the study could be used as a basis for further research which will be presented and discussed in subsequent surveys and scientific forums.

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