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# Work and Rest Hours of Deck Cadets Vis-à-vis Their Productivity Onboard Training Ship in a Structured Onboard Training Program

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*ABSTRACT*

Onboard Training (OBT) has been recognized as one of the most effective means of practical training for seafarers as part of Maritime Education and Training. The International Convention on Standards of Training, Certification and Watchkeeping for Seafarers 1978, as amended prescribes 12 months as the minimum mandatory seagoing service for candidates for officers in charge of a navigational watch. Within this period, cadets are required to complete their OBT requirements which may include Training Record Book tasks, project work, among others. In terms of cadets' work and rest hours onboard the ship, the Maritime Labour Convention (MLC), 2006 stands as a pivotal governing international instrument including the working and living conditions of seafarers, in general. This study aimed to determine the relationship between the amount of work and rest hours to the productivity of deck cadets in a structured OBT program onboard a training ship. Through quantitative research, the researchers gathered the records of work/rest hours of 54 deck cadets during their training program and analyzed their OBT documents to determine their progress. Results showed that the cadets were able to accomplish their OBT requirements within the allowable work hours as stipulated in MLC, 2006. Further, the researchers concluded that there is no relationship between the number of rest hours and their productivity, which was attributed to the merits of a structured OBT program. This study recommends to look for opportunities to improve the structured OBT program onboard training ships, and furthermore, investigate the same onboard commercial vessels setting.



## 1. Introduction.

Seafarers' rights are protected by the Maritime Labour Convention (MLC), 2006 which ensures their decent working and living conditions (Ntovas, 2014). The MLC, 2006 does not just protect the seafarers but also it provides a fair framework for shipowners to follow to ensure their compliance with the regulations (Adăscălitei, 2014). This helps the instrument to be accepted by many countries. It is one of the most widely accepted conventions of the International Labour Organization (ILO) and serves as the "fourth pillar" that completes the international regulatory regime for quality shipping (McConnel et al., 2011). However, there are still challenges in its implementation, particularly for cadets. Although cadets are considered trainees, if they are performing work onboard, the MLC, 2006 says that they are considered seafarers (ICS, n.d.). This can be also a problem specially on ships operating outside the definition of ships in the MLC, 2006. Thus, there may be a gap in how well the MLC, 2006 protects cadets undergoing sea service experience onboard training ships. The structure of onboard training (OBT) for cadets varies depending on the type of vessel and the specific tasks required (Abangan et al., 2020).

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The training program is designed to enhance the cadets' knowledge and skills, with a focus on personal qualities and professional knowledge (Sevilla and Arceno, 2017). Special attention is given to the health maintenance of underage trainees, with a temporary work and rest regime established for cadets (Botnaryuk and Timchenko, 2023).

A key concern is whether the design and structure of OBT programs ensure adequate rest for cadets, even when they are asked to perform tasks outside of regular working hours. While cadets are still students, and homework is a natural part of education and training, its impact on their ability to perform onboard duties safely should not be overlooked especially since these duties can sometimes be dangerous.

This study was conducted to investigate the work and rest hour compliance of cadets during OBT. Specifically, it aimed to examine the relationship between the structure of shipboard training programs and the work-rest hours observed by cadets, and how this relates to their ability to complete their assigned training tasks.

## 2. Work To Rest Hour Ratio.

The working hours and rest time of cadets onboard merchant ships are cause of concern, with many reporting long working hours and limited rest time (Kim, et al., 2018). MLC, 2006 regulates the required work and rest hours of seafarers – 10 hours in any 24-hour period and 77 hours in any seven-day period. Moreover, the hours of rest may only be divided into at most two periods, one of which is at least six hours long.

## 3. Onboard Training (OBT).

OBT for seafarers is crucial for their safety, performance, and the overall competence of maritime operations (Tvedt et al., 2018; Felicia et al., 2010). In terms of cadets, Lee et al. (2021) highlighted that OBT environment is important for continuity of their maritime careers and for the wider maritime industry. Practical training is an absolute must for every type of seafarer's education (Demirel, 2020).

The challenges and opportunities of OBT for cadets seafarers are multifaceted. Magsino et al. (2023) and Lee et al. (2021) both highlighted the need for improvements in the OBT environment, with a focus on technical tasks, work stress, and the provision of personal protective equipment. These challenges are compounded by the rapidly modernizing maritime industry, as discussed by Mickevičiūtė (2020), which necessitates the transformation in seafarer education and training to include the development of social skills and emotional intelligence. Despite these challenges, the potential for improvement of OBT is evident, particularly in areas of safety, technical skills, work-rest hour observations, and the new integration of new technologies. The integration of these factors requires a well-design structure for OBT.

### *3.1. Structured vs 'No Structure' Onboard Training Programs.*

Bowman (2008) found that structured OBT is preferred over unstructured training, and there are significant differences in learning environments aboard ships. Jacobs (2019) further emphasized the benefits of structured OBT, noting that it leads to better outcomes and is dependent on task analysis. Abangan (2020) supported this, showing a significant relationship between proper conduct of structured OBT and the vessel's profile. These studies collectively suggest that structured OBT may be more effective in the maritime industry. In the context of this research, structured OBT program refers to the training of deck cadets onboard training ship, following a designed program which is mainly based from the training record book and the curriculum, both as required by the Administration. Further, the delivery of the said program is supervised by designated Shipboard Training Officers (STO).

### *3.2. Onboard Training Requirements.*

According to the STCW Convention Regulation II/1, one of the requirements for deck cadets is to have an approved seagoing service of not less than 12 months, including OBT which should be documented in an approved training record book (TRB) in order to become officer-in-charge of a navigational watch (OIC-NW). In the Philippines, the TRB that is used is the Deck Cadet Structured Training Programme Record Book of GlobalMET.

The said TRB includes tasks from different Functions and competencies. Function 1 (F1) – Navigation includes tasks pertaining to terrestrial, celestial, and electronic navigation, among others. Function 2 (F2) refers to cargo handling and stowage and Function 3 (F3) are competencies involving controlling the operation of the ship and care for persons onboard. F2 is excluded in this study since the training ship used for OBT in this research does not carry cargo. In addition, a list of tasks comprising the project work is included and a supplementary workbook – Deck Cadet Shipboard Activity Work Book also needs to be accomplished.

Per the requirement of Commission on Higher Education (CHED) and Maritime Industry Authority (MARINA), a deck cadet is required to observe bridge watchkeeping duties for at least 180 days and these have to be documented in the Bridge Watchkeeping Duties Daily Journal. Some of the tasks include plotting ship's position, posting as lookout, steering, testing the equipment, and assisting the Officer of the Watch (OOW), among others. The record daily which means a 4-hour watch posted twice – one in the morning and one in the afternoon, will have a single entry.

All of these documents have to be signed by the designated STO to attest their accomplishment. A signed task or document entails that a requirement had undergone and passed the assessment conducted by the STO. For TRB tasks, the assessment is done orally, with other tasks requiring practical demonstration in carrying out the task. This also applies to Daily Journal. For the rest of the tasks, the cadets are required to submit an output to the satisfaction of the assessment, also conducted by the STO. A cadet is required to accomplish all TRB tasks,

project work, workbook, and as stated, 180 days of observing bridge navigational watchkeeping duties. Table 1 summarizes the OBT requirements for deck cadets in the Philippines.

Table 1: Summary of OBT requirements for deck cadets in the Philippines.

| OBT requirement | Required accomplishment |
|---|---|
| TRB tasks | 100% |
| Project Work | 100% |
| Work Book | 100% |
| Daily Journal | 180 days |

Source: Authors.

## 4. Methodology.

This study employed a quantitative approach using qualitative methods, specifically interviews and document analysis. Participants included 54 male deck cadets which were grouped into four based from the OBT design. Each group had a designated STO to oversee the training and assessments. The OBT, which is the first-time experience of the participants, was conducted onboard the training ship MV Kapitan Gregorio Oca for 21 days, instead of 30 days due to other factors beyond the scope of this research. In this research, only the accomplishment for Function 1 – Navigation and Function 3 – Controlling the Operation of the Ship and Care for Persons on Board were utilized as the training ship is only limited to these functions with the absence of Function 2.

The researchers used a spreadsheet to quantify the work and rest hours of the cadets, obtained by interviewing the respondents daily about their work hours allotment, in addition to analyzing the cadets' daily training schedule (DTS) according to the program. It is important to note that following the planned program, the cadets attend the same lectures, drills, and practical demonstrations. However, in terms of accomplishing their OBT requirements beyond what is officially scheduled in the DTS, the allocated hours spent varied, as some allotted extra hours to complete their OBT requirements. For the different OBT requirements, each of the cadet's TRB, Sea Projects, Daily Journal, and Workbooks were collected for document analysis to determine their productivity.

In the analysis of data, descriptive statistics was used in the discussion of the work and rest hours, and OBT requirements. Moreover, inferential statistics was used to determine the correlation of work hours and OBT requirements specifically Pearson correlation coefficient while one-way ANOVA was used to find the significant difference of groups in terms of their work hours and OBT requirements accomplishment.

## 5. Results and Discussions.

### *5.1. Work and Rest Hours.*

The program was run following the design stated in the Daily Training Schedule (DTS) where work hours spent on lectures, drills, practical demonstrations, navigation and port watches took an average of 6 hours daily, including weekends, and shore leaves, which was accounted for as rest hours. As stated above, cadets allocated extra hours beyond what is stated in DTS to accomplish their OBT requirements, which is presented in Table 2.

Table 2: Average work and rest hours spent by cadets to accomplish their OBT requirements.

| Group Number | Average required work/rest hours spent daily | Average extra work hours spent daily | Average total number of work/rest hours daily |
|---|---|---|---|
| Group 1 | 6.0 / 18.0 | 3.3 | 9.3 / 14.7 |
| Group 2 | 6.0 / 18.0 | 3.7 | 9.7 / 14.3 |
| Group 3 | 6.0 / 18.0 | 3.6 | 9.6 / 14.4 |
| Group 4 | 6.0 / 18.0 | 4.2 | 10.2 / 13.8 |

Source: Authors.

To simplify, the cadets spent 9.3-10.2 work hours daily during their OBT. Conversely, their average rest hours were recorded 13.8-14.7 hours, where 8.0 hours is scheduled for sleep, and the rest were for cadets' welfare including recreation and shore leave. Sleeping call schedule was strictly implemented and observed at 2200H to 0600H daily, where violators were issued delinquency reports.

### *5.2. OBT Requirements Accomplishments.*

#### *5.2.1. Training Record Book.*

Following the design of OBT, there were 49 tasks combined from Function 1 and Function 3. Table 3 presents the accomplished TRB tasks of the cadets, according to their group average.

Table 3: Number of TRB tasks accomplished by deck cadets in groups.

| Group Number | Average of accomplished TRB F1 tasks | Percentage of the accomplished TRB F1 tasks based on the program | Average of accomplished TRB F3 tasks | Percentage of the accomplished TRB F3 tasks based on the program | Percentage of the accomplished TRB tasks based on the OBT requirement |
|---|---|---|---|---|---|
| Group 1 | 31 | 93.9 % | 10 | 76.9 % | 12.2 % |
| Group 2 | 7 | 21.2 % | 4 | 30.8 % | 2.1 % |
| Group 3 | 33 | 100 % | 13 | 100 % | 13.7 % |
| Group 4 | 33 | 100 % | 13 | 100 % | 13.7 % |

Source: Authors.

Both Group 3 and Group 4 cadets accomplished all their required OBT for the training program, which accounted for 13.7% of the entire OBT requirements for the whole year, while Group 1 accomplished 12.2%. However, Group 2 cadets only accomplished an average of 7 and 4 tasks for F1 and F3, respectively, which is only 2.1% of the entire OBT requirement.

#### *5.2.2. Sea Project.*

There are 37 project works in total for Function 1 and Function 3, and in this program, 13 project work tasks were scheduled to be accomplished by the cadets. Table 4 presents the number of project work tasks accomplished by the participants.

Table 4: Number of TRB tasks accomplished by deck cadets per group.

| Group Number | Average of accomplished Project Work tasks | Percent (%) for the month-program | Percent (%) based on the entire OBT |
|---|---|---|---|
| Group 1 | 13 | 100 | 35.1 |
| Group 2 | 13 | 100 | 35.1 |
| Group 3 | 13 | 100 | 35.1 |
| Group 4 | 13 | 100 | 35.1 |

Source: Authors.

All participants accomplished all the assigned tasks for the program which is 35.1% of the total requirements of OBT. Several sessions of Project Work are included in the Daily Training Schedule, thus, the 100% accomplishment of all cadets. Moreover, Project Work accomplishment was included in the requirement for cadets to be able to observe shore leave.

*5.2.3. Daily Journal.*

As stated above, a deck cadet should observe at least 180 days of bridge watchkeeping duties, including navigational and anchor watch. The Daily Journal of the cadets is entry-based relative to the number of their duty in the bridge, which is signed by their counterpart duty officer and/or STO who validated the entry made, making it official. A cadet can only have an entry once one per duty and each entry must contain all important and relevant information that cadets demonstrated in the duration of their watch. Table 5 presents the number of days spent by the cadets doing bridge watchkeeping duties.

Table 5: Number of days observed on bridge watchkeeping duties by deck cadets per group.

| Group Number | Average of days observed doing bridge watchkeeping duties | Percentage based on the total number of OBT requirement (180) |
|---|---|---|
| Group 1 | 13 | 7.2 |
| Group 2 | 13 | 7.2 |
| Group 3 | 13 | 7.2 |
| Group 4 | 13 | 7.2 |

Source: Authors.

All participants observed 13 days doing bridge watchkeeping duties, which comprise 7.2% of the total OBT requirement. All cadets were assigned equal bridge watchkeeping duties which was based on the program, thus, the same number of accomplishments.

*5.2.4. Work book.*

The total number of required tasks in Work book for the whole OBT is 176. In this program, 12 Work book tasks were included. Table 6 presents the number of work book tasks accomplished by the participants.

Table 6: Number of days observed on bridge watchkeeping duties by deck cadets per group.

| Group Number | Average of Work Book tasks accomplished | Percentage based on the total assigned Work Book tasks in the program | Percentage based on the total number of OBT requirement (180) |
|---|---|---|---|
| Group 1 | 12 | 100 | 6.81 |
| Group 2 | 12 | 100 | 6.81 |
| Group 3 | 12 | 100 | 6.81 |
| Group 4 | 12 | 100 | 6.81 |

Source: Authors.

All participants accomplished all the assigned work book tasks for the program, which is 12, comprising 6.81% of the total OBT requirements. Like project work, work book sessions were also included in the DTS and were made requirement for shore leave, thus, the 100% accomplishment of all cadets.

*5.2.5. Relationship of Work/Rest Hours and OBT requirements accomplishments.*

The correlation of work/rest hours and the accomplishment of OBT requirements was determined using the Pearson correlation coefficient which generated an overall value of 0.02 which means very low correlation. In the cadets' work-rest hours spent, the four groups have no significant difference after calculating for ANOVA. In the same manner, ANOVA was also calculated for the OBT task accomplishments where the results yielded that there is a significant difference. The summary of these findings is presented in Table 7, including the results when participants are grouped according to their OBT groupings.

Table 7: Summary of correlation of Work-Rest Hours and OBT accomplishments and significant difference in Work-Rest Hours and OBT requirement accomplishments.

| Group Number | Correlation of Work-Rest Hours and OBT requirement accomplishments | Significant difference in the Work-Rest Hours | Significant difference in OBT accomplishments |
|---|---|---|---|
| Group 1 | High positive correlation | No significant difference | There is a significant difference |
| Group 2 | Moderate negative correlation | | |
| Group 3 | Very low negative correlation | | |
| Group 4 | Low negative correlation | | |
| Overall | Very low positive correlation | | |

Source: Authors.

## 6. Interpretation of Results.

The average work hours spent by cadets onboard the training ship is enough and is within the allowable period, per MLC, 2006. Due to their structured OBT program, even the sleeping hours under rest hours is strictly implemented, wherein violators receive delinquency report. Quality sleep is crucial for seafarers, as it impacts their perceptions of risks (Hystad et al., 2017), their health and performance (Schmied et al., 2020) and their psychological capital (Hystad & Eid, 2016). The rest of their rest hours were spent in recreational activities including shore leave. Oldenberg (2019) highlighted the need for improved leisure time opportunities onboard, including shorter work assignments. Their work hours included performing bridge watchkeeping duties, attending lectures and drills, and performing other practical maintenance. It is important to note that project works were also allocated time under work hours. The four groups of cadets had no significant difference in terms of hours spent to work-rest hours as well. The cadets were able to accomplish all the program requirements in Project Work, Work Book, and Daily Journal. However, they had significant difference in terms of accomplishments of TRB tasks. Moreover, the four groups had differences when the relationship of their OBT requirements accomplishments and work-rest hours spent were compared.

## Conclusions.

The success of complying the OBT requirements of deck cadets within the allowed work hours is possible in a structured OBT program. OBT, without structure, may compromise the work-rest hours compliance of cadets which may even result to less accomplished OBT requirements. This study revealed that onboard a training ship, OBT requirements can be accomplished in a structured OBT program observing the regulations stated in MLC 2006, specifically in complying with work-rest hours of cadets. However, it is important that the delivery of the program, although with different STOs, should be objectively followed, aiming for equal exposure and skills development of cadets.

## Recommendation.

This study was conducted onboard a training ship with no cargo, thus no cargo operations, and where rules and regulations were strictly implemented putting high regard to cadets' training which is geared towards the accomplishment of OBT requirements. The researchers recommend that the same study should be conducted onboard other types of commercial cargo vessel where cadets' training conforms to the vessel's schedule which could be busy in nature. Regardless, a structured OBT should also be followed onboard such vessels. Further studies may also be conducted following the results that there is a significant difference in accomplishing the OBT requirements by cadets, focusing on the delivery and design of the OBT program.

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