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Exploring Strengths and Weaknesses in Professional Marine Pilot Education

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ABSTRACT

This article presents findings from a Strengths, Weaknesses, Opportunities and Threats (SWOT)-analysis of the current marine pilot training. Five experts participated in a focused group interview. The results show that the training is strengthened by the wide variety of practical experiences that the instructors gain from actively working as pilots while being engaged in the education. Furthermore, the advantage of being able to use real-life experience to design training units increases the transferability of training to work settings. However, the experts also highlight the general lack of organizational support and pedagogical training, which may affect the quality and delivery of the education, as well as the lack of short- and long-term evaluation, so it remains unknown what parts of the education are successful and where potential improvements are necessary. The paper concludes by arguing that maritime pilot training should be developed into a professionalized teaching practice.

Keywords: SWOT-analysis, Maritime education and training (MET), Maritime safety

INTRODUCTION

In 2020, the global merchant fleet encompassed 98715 vessels with a carrying capacity of 2.1 billion dwt (UNCTAD, 2020). Thus, maritime transport can be considered as one of the major transport modes and the backbone of the globalized economy. Shipping can furthermore be regarded as a high-risk industry (Perrow, 1999) with a potential to cause negative consequences not only to those serving onboard, but also to the marine environment and the general public in case of an incident or accident. To ensure safety in operations, training and education are considered as one of the foremost means to equip mariners with essential skills and necessary tools (Praetorius, Hult and Österman, 2020). Other means include governmentally introduced safety measure, such as Vessel Traffic Services (VTS) or pilotage.

A particularly safety-critical part of a ship's voyage is the port approach. Port approaches normally pose high demands on the skills of ship-handlers due to the traffic density, limited navigational space and local circumstances that need to be taken into concern in to enable a safe voyage into port (National Research Council, 1994). Thus, many port approaches and other sensitive sea areas require vessels to make use of marine pilotage to ensure safe passage.

Marine pilotage is one of the foremost measures to increase maritime safety and decrease the risk for hazards in areas that are challenging to navigate in. Pilotage is usually carried out by marine pilots, who are mariners with local expertise that support and consult a vessel's master in navigational matters. Their work enables an effective communication with local and shore-based service, thus promoting a safe passage (Darbra *et al.*, 2007). As pilots play a crucial role in ensuring maritime safety and protecting the environment, training and education play a particularly important role.

This study presents findings from a focused group interview that was conducted with five experienced pilots, who also work as instructors within the marine pilot education. The aim of the interview was to explore strengths and weaknesses in today's education, as well as to identify potential opportunities and threats for the current training regime. Furthermore, the focus group also intended to highlight potential future directions for improvements of the professional education and training, especially with regards to novel technology.

SWOT-ANALYSIS AS ANALYTICAL TOOL

The so-called SWOT-analysis is a strategic planning tool developed in the late 1960s to explore how to achieve a good fit between external or contextual factors (threats and opportunities), and internal characteristics of an organization or business (strengths and weaknesses) (Hill and Westbrook, 1997). The aim of a SWOT is to provide support in complex decision-making processes by ordering and reducing the amount of information available to guide the decision makers (Arslan and Turan, 2009). The first publications using SWOT-analyses appear to stem from the 1960s, but the origin itself remains unknown according to (Helms and Nixon, 2010)

While traditionally utilized for strategic management decision and policy development, within recent years the analytical tool has been applied to wide variety of domains and problem spaces. Examples for applications in the maritime domain are the enhancement of safety analyses and risk reducing measures for marine casualties in the Istanbul Straight through combining SWOT with an Analytical Hierarchy Process (AHP) method (Arslan and Turan, 2009), suggested improvements to institutional efficiency in maritime higher education based on questionnaire data analyzed with the help of the tool (Paraggua, Mobo, Ronalyn C. Acuavera, Villavicencio and Pasa, 2022), and the use of SWOT to identify what constitutes successful bridge team organization (Arslan and Er, 2008).

Within the area of education and training, several studies report the usefulness of SWOT when exploring potential training needs and education program developments. Longhurst et al. (2020) used a SWOT to analyze how higher education institutes adapted their anatomical education as response to the ongoing pandemic. The analysis enabled highlighting of similarities and differences in how universities changed their training delivery and teaching modality to meet the constraints imposed by the pandemic crisis. They found that the tool was useful to initiate discussions and strategy development of curricula and assessment methods. Another example for an educational

application of a SWOT has been presented by Engelbrecht, Lindeman and Hoermann (2019) who discuss the application of VR technology in the training of professional firefighters. They found that VR is cost-effective and allows the training of challenging events in a safe environment, as well as lessons learned in other high-risk domains may be easier transferred to the firefighting domain. However, in terms of weaknesses and threats, limited knowledge about the applicability of VR technology for team training, as well as the uncertainty of skill transfer and potential skill decay were identified by the researchers.

The usefulness of the SWOT-analysis to improve training evaluation has been discussed by Wankhede et al. (2021) who propose a self-evaluation matrix for trainees and mentors within the Indian surgical training. Their adopted approach can both be used to identify gaps and deficiencies within the current training regime, as well as it can help to foster discussions between mentors and trainees through highlighting trainee perceptions. They also found that SWOT as tool for self-evaluation actively promotes the development of strategies to seize potential opportunities within the training.

METHODOLOGY

To explore current strengths, weaknesses, threats and opportunities within the marine pilot education program, a SWOT-analysis was conducted with five experienced pilots in a focus group interview. The SWOT was conducted as part of a focused group interview (Patton, 2014) and aimed to provide a structure for the discussions.

Participants

Five professional pilots involved in the current pilot education participated in the focus group. All respondents are holders of an unlimited master license and have previously served in the merchant fleet before becoming marine pilots. The years of working experience in the merchant fleet ranged from 8 to 15 years, and experience as marine pilot from 13 to 23 years. Further, the respondents represent different pilotage areas along the Swedish coast. In addition to working as pilots, all the respondents are engaged in the professional education for marine pilots as instructors. Their area of expertise included among others simulator-based training, maritime resource management, and on-the-job training of both pilot trainees and experienced pilots. Due to the limited number of subject matter experts within this domain, further information about the participants will not be disclosed to ensure confidentiality.

Procedure

Prior to the interview, all respondents had received an information sheet about the project, the focus group's aim and how participant data would be handled. They had also been asked to provide demographic information (age, educational background, years as pilot etc.) and submit a signed consent form ahead of the scheduled interview.

The SWOT was conducted as a focus group interview via a digital meeting software due to the ongoing pandemic and lasted approximately 3 hours. A web-based tool to facilitate cooperative working and knowledge sharing was used to support the SWOT-analysis and provided a digital whiteboard where participants could choose to fill in and categorize digital post it-notes during the focus group.

The focus group started by a short introduction to the project and the aim of the scheduled discussion. The web-based tool was introduced as means to facilitate collaboration during the interview and a link to the online whiteboard was provided to the participants. After the participants had been given the chance to ask questions, the interview and recording started.

Each of the four aspects of the SWOT was discussed separately, but the procedure remained the same throughout the whole focus group. The order of the discussion was that first strengths, then weaknesses, opportunities and last threats were discussed. Each of the discussions took approximately 30 to 40 minutes and started by the participants having 10 minutes to note down all aspects they perceived in relation to the aspect under discussion. Each aspect was noted on a digital post it-note and the online whiteboard enabled the participants to see each other's notes. After 10 minutes, the two moderators took 5 minutes to sort all the notes and then started a moderated discussion by explaining which groups of aspects had emerged. In the discussion the participants were encouraged to provide details on the identified aspect, give examples and explain their reasoning. The recordings of the focus group were transcribed verbatim to facilitate the analysis.

RESULTS

The following paragraphs will present a summary of the strengths, weaknesses, opportunities and threats identified by the experts.

Strengths

The experts highlight that the current pilot education shows a good balance between theory and practice. This is achieved by varying the training context and modality. Classroom-based teaching is combined with simulator training and complements the more traditional on-the-job training onboard. It is also emphasized that the instructors have open dialogue with each other, which helps to make use of the wide experiences and expertise among trainers and trainees. Furthermore, being an instructor and active pilot at the same time enables the experts to keep training units up-to-date and student-centered, which may also increase the overall transferability of training content to the work settings.

Weaknesses

In the current pilot education, an emphasis is put on instructors being active pilots at the same time as they train professionals. While this is an advantage with regards to the training content, the experts expressed that they feel a lack of organizational support when it concerns improving their own pedagogical

training and competence. This is, according to the participants, likely to affect the overall quality and delivery of the courses.

Further, the current pilot education is not evaluated formally. The experts raise both a lack of short- and long-term evaluation as a weakness, as it makes it impossible to see whether certain training initiatives really prove to be successful in creating positive performance outputs for specific individuals within the program. It remains therefore unclear to what extent individual traits, experiences and specific training units contribute to a trainee becoming a successful pilot.

In relation to individual trainee performance, it was also discussed that the outcome, especially of the training onboard, is depending on the trainees' supervisors and their own willingness to learn to maximize the learning outcome. This allocates a lot of the responsibility to the actual trainee and might lead to different training outcomes based on the individual motivation. Further, as performance measures create a focus on quantity, for example number of pilotages executed, rather than quality, e.g., in terms of specific performance goals, individual trainees and their performance as pilots and service delivery may differ.

Lastly, the experts express that international cooperation with other pilot organizations currently is lacking, but that it would be of benefit to be able to identify lessons learned and potential improvements from other organizations.

Opportunities

The experts highlight that the current education has been developed over time, but that there are many opportunities both with regards to teaching methods and modalities, as well as to educational context that may be seized. At the moment, much of the training is focused on what goes wrong and how to prevent mishaps and errors. However, with a shift of focus towards what goes right within the operations, there is an opportunity to create new training content. As pilot operations only show few adverse events, such as incidents or near-misses, the number of pilotages that goes right is much higher and thus should offer many examples of what characterizes successful or positive performance.

Further, smart or novel technology has been highlighted as a potential support for training on shore and onboard. Eye-tracking, motion sensors and heart-rate measurements are named as some of the technologies that may support instructors and pilots in their work, e.g., through helping to identify certain information processing or spatial movement patterns, or for early identification of stress. It is also mentioned that real-life operations could increase in safety if psychophysiological measures could enable feedback to individuals, i.e., tell if a person is suffering from fatigue, or help to understand what it means to be alert in real-life settings.

Threats

The threats identified by the experts have been grouped into two larger areas; differences in background and types of trainees, and fear of being evaluated and reporting culture.

Pilot trainees normally have already had a career at sea within the merchant fleet. However, their background can differ quite widely, which might pose a challenge for instructors when students are not particularly receptive to new knowledge relying mostly on the experience from their previous career. Further, through the past years, there has been a decline in applicants, which means that the average trainee has less and often different experiences than what trainees used to have. Thus, it creates a need to increase the understanding of how certain skills and talents may affect training needs and outcomes, especially when trying to weigh in the importance of previous experience at sea and understanding how experience may, or may not, transform into expertise.

The experts raised the problem of learning from real-life events and situations, as they experience a fear of being evaluated among the active pilots in the organization. They partially associate this with the legal circumstances as, in case of an incident, pilots can be hold accountable for potential costs, thus any full disclosure or recognition of individuals' errors might lead to negative consequences. Therefore, pilots might be reluctant to report any potential error, which in turn limits and impacts on the ability to identify current or future training needs.

DISCUSSION AND CONCLUSION

This study set out to explore potential strengths, weaknesses, opportunities and threats in the professional education and training of marine pilots. The SWOT-approach was chosen to structure a focused group interview and to identify potential areas of improvement. Results show a professional education with similar strengths and weaknesses, opportunities, and threats as maritime educational programs within the academic system. As seen in Sellberg (2020), maritime instructors are recruited based on their extensive experience as working professionals. At the same time, there is a lack of effort in developing their pedagogical skills to handle the complexity of training and assessing new maritime pilots developing expertise in advanced maritime operations. Introducing new technologies, such as eye-tracking and different sensors, are seen as opportunities to strengthen maritime instructors in their work. However, it is important to acknowledge that introducing such technologies into current training practices need to be matched with opportunities for professional development. Ideally, maritime pilot training should be developed into a *professionalized teaching practice*. A professionalized teaching practice can be understood as a process through which teachers advance their levels of professional competence throughout their careers (Fernández, 2013). This process includes a learning period when entering the academic teaching profession, taking teaching and learning in higher education courses and the teachers' self-directed learning. This in turn implies that teachers recognize areas in the own teaching practice in need of improvement and works in a structured and scientific way to advance their teaching. We argue that conducting a SWOT-analysis with instructors can serve as a starting point for initiating a reflection on teaching and assessment practices.

In this study, the SWOT did not only show to structure the discussions among the experts, but also allowed them to explore and highlight issues on several different levels within the educational system, such as aspects related to the individual trainee, or organizational support and barriers. However, while the SWOT-analysis may support structured brainstorming, which can help to identify potential strategies for curricula or educational program design, it cannot serve as a stand-alone tool and should only be considered as a trigger for discussions, not as something generating a validated solution or pathway.

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