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# What skills do port pilots need?

Diploma thesis in the Master Mariner Programme

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REPORT NO. SK-14/171

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Gothenburg, Sweden, year 2014

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Cover: Picture of Atlantic Cartier crossing the Atlantic. Picture taken by Henrik Nicander.

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## **What skills do port pilots need?**

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### **Abstract**

Port pilots have the important task to guide the vessel safely on the first and last part of its voyage between ports. In addition to safely guide the vessels, the pilots also have the responsibility to protect the environment and to increase the efficiency in the harbor. (IALA, 2012)

What skills do port pilots need and how they acquire these is the main research question that this thesis's will try to answer by using a literature review and semi-structured interviews as data collecting methods.

Our conclusions of this is that the investigated literature and our interview agrees on that previous maritime experience as an officer is an important part of being a pilot that can understand the communication on the bridge, with tugs and cooperating between pilots. Despite that previous experience is so important, the international rules do not have this as a demand to become a port pilot.

To educate the pilots in the local area knowledge, the CPA uses simulators, scale models and working next to an experience port pilot to let the experience and knowledge be passed on from pilot to pilot.

It is also important to keep the pilots technological skills up to date to avoid accidents, this can be provided by the makers of IBS systems software's.

**Keywords:** (Maritime piloting, Port pilot, MONALISA2.0, Piloting education,)

## Sammanfattning

Lotsar har den viktiga uppgiften att guida ett fartyg på den första och sista delen av dess resa mellan hamnarna. Förutom att guida fartyget till eller från hamn så har lotsarna också ansvaret att skydda miljön och att öka effektiviteten i hamnarna. (IALA, 2012)

Vilka färdigheter som hamnlotsar behöver och hur man får dessa färdigheter är den huvudsakliga frågan som denna uppsats skall försöka besvara. Detta genom att göra en litteraturstudie och använda semi-strukturerade intervjuer för insamling av data.

Vår slutsats är att den undersökta litteraturen och vår intervju överensstämmer om att tidigare erfarenhet till sjöss som befäl är en viktig del av att vara en lots som kan förstå kommunikationen på bryggan, med bogserbåtar och samarbetet mellan lotsar. Trots att tidigare erfarenhet är väldigt viktigt så är detta enligt internationella regler inte ett krav för att kunna bli hamnlots.

För att utbilda lotsar i lokalkännedom tillhandahåller CPA simulatorer, skalenliga modeller och möjligheten att jobba vid sidan av en erfaren hamnlots för att låta erfarenhet och kunskap föras vidare från en lots till en annan.

Det är även viktigt att hålla lotsarnas tekniska färdigheter uppdaterade för att undvika olyckor, detta kan föras av skaparna till programvaran IBS systems.

**Nyckelord:** (Maritime piloting, Port pilot, MONALISA2.0, Piloting education,)

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# List of acronyms

- IALA International Association of Lighthouse Authorises
- IMO International Maritime Organization
- VTS Vessel Traffic Services
- CPA Competent Pilot Authority
- IBS Integrated Bridge System

# 1 Introduction

Port pilots have the important task to guide the vessel safely on its first and last part of their voyage between ports. In addition to safely guide the vessels, the pilots also have the responsibility to protect the environment and to increase the efficiency in the harbor (IALA, 2012). Pilotage occurs in over 54 countries worldwide (International Maritime Pilots Association, 2014). In Sweden alone, over 35 000 pilotage missions are performed each year, due to its location by one of the busiest seas in the world (Baltic Sea) and its unique archipelago.

The result of an unsuccessful pilotage can have devastating consequences to the environment, human lives and the economy (Darbra, Crawford, Haley, & Morrison, 2007). Due to the growing ship sizes, the importance of a successful pilotage has increased over the years and the pilot's faces new and most of all, more technical challenges (Herberger, o.a., 1994).

There are no previous research that addresses what port pilot's values as the most important skills that they need to perform a safe pilotage mission and how their view differs from what the international guidelines states as demands to start the pilot education (Transportstyrelsen, 2012) (Darbra, Crawford, Haley, & Morrison, 2007) (IALA, 2012) (IMO, 2004) (Mikkers, Henriqson, & Dekker, 2012) (Herberger, o.a., 1994).

We are therefore going to investigate key factors that are necessary to safely perform pilotage in ports and how the pilot's education faces these demands today.

## 1.1 Purpose

The purpose of this essay is to determine what experienced pilots and the literature consider are the most important skills to provide a safe pilotage, how and where the pilots acquire these skills. What is the minimal international demand to start your piloting training? And how does this demand vary from the actual demands that the CPA (Competent Pilot Authority) places as the national demands to become a pilot.

How does the pilot training centers education and focus differ from the challenges and problems that port pilots actually face in their work?

A part of the purpose is to provide qualitative data to the Monalisa2.0 project that will provide ship and shore with an information exchange between ship and shore. At the same time, parallel studies will investigate how deep sea, remote pilotage and Vessel Traffic Services (VTS) are taking place.

## **1.2 Questions**

The question that the thesis will investigate is what skills do port pilots need, and how do you acquire these skills?

## **1.3 Delimitations**

This thesis will only investigate in port piloting, any other part of the pilots' working areas such as deep sea pilots, long pilots or remote piloting will not be examined in this thesis. Neither will the thesis take in account the work that the Vessel Traffic Service (VTS) does to guide ships and assist the pilot's with advice and updates about the shipping traffic in the area.

Due to the time limit we will only be doing one interview in Finland with a well experienced pilot and a literature review containing documents from Sweden, Finland and USA. Limits in the literature review will be that documents are not older than 20 years to provide this thesis with relevant data.

## 2 Background

A vessel often needs navigational assistance that can guide them in or out of the port in a safe and effective way. Navigation assistance can be provided by a pilot, a person that has special training to assist vessels and to have a superior local knowledge about the fairways, shallow waters, current and all other special conditions in the area (IALA, 2012). The most important task given to the pilots is to navigate in a safe way and protect the environment (Lappalainen, Kunnaala, & Apaninen, Present pilotage practices in Finland, 2013).

In most ports, it is mandatory for vessels to take a pilot on board when entering or leaving special or difficult areas. (IALA, 2012). In Sweden for example, they divide vessels in different pilotage categories based on, size, cargo and areas, so that the master can see where and if it is mandatory to take a pilot on board (Transportstyrelsen, 2012).

According to IMO, national governments should establish a Competent Pilotage Authority (CPA). CPA means the regional or national government or organizations that by tradition or law, provide a pilotage system. The CPA in Sweden is Swedish Maritime Administration, they are responsible for all pilotage missions in Sweden (IMO, 2004).

CPA is responsible for the training, license and the certificates that pilots require for pilotage. The CPA educates their pilots by classroom instruction, simulation and also through practical experience on board vessels under piloting conditions, under close supervision of experienced pilots (IMO, 2004).

The international guidelines for educating pilot's states that the CPA should set a minimum requiring level considered previous maritime experience, educational level and medical fitness when selecting new pilots. Pilots with no previous experience on the other hand can also become pilots if the CPA can provide education that can replace the experience that piloting demands. It also states the minimum demands of what should be included in the education (IALA, 2012).

To become a pilot in Sweden, you need first of all to get a university degree as master mariner. After your degree, you need at least 36 months at sea going service out of which 12 months has to be as a chief officer before claiming your master mariner license (Transportstyrelsen, 2011). This assure that the pilot have the necessary skills and knowledge that Swedish Maritime Administration demands (Sjöfartsverket, 2011). CPA is responsible for setting the amount of sea time that the pilots need before starting their pilot education (IMO, 2004).

When you have gained experience as a master for several years, the Swedish Maritime Administration has their own internal education for pilots. Normally it takes 6-12 months depending on the size of the piloting district, before you can assist a vessel without supervision. The education continues while you work as a pilot and after two to four years you are licensed to pilot vessels of all sizes (Sjöfartsverket, 2012) (Sjöfartsverket, 2011).

Nations around the world has their own diverse standards on the education system for pilots, so the quality can vary from nation to nation. A standardisation in the education between nations would increase the efficiency and safety of pilotage (IALA, 2012).

USA differs from Sweden when you compare pilots experience requirement to be allowed starting on the pilot's education. It is not a requirement to have licence as master or any navigational knowledge and marine experience before you join the pilot education. USA has a four to seven years long apprenticeship program to become a pilot in a specific area. In this program they learn about basic ship handling and the specified pilotage area, they only get licence as pilot (American Pilots' Association, 2014). As in Sweden they also practice in simulators and have practical observation on board ships during piloting with experienced pilot. Each state decides the number of pilots and the ports are served by one national pilot association. Due to the efficiency and safety, there are no competitive private pilotage companies in the pilot system in the USA (American Pilots' Association, 2014).

In Australia, they also differ from Sweden and USA because most pilots work as independent free-lancers that are contracted by commercial companies. This can result in that the pilots are feeling commercial pressure from their contractors and not prioritize safety (Darbra, Crawford, Haley, & Morrison, 2007).

Previous research that looks at pilots education compared with where and how they acquire the necessary skills to become experienced pilots can to our knowledge not be found, the documents found only contains national and international demands that specifies the experience you need to start you pilot training (Transportstyrelsen, 2012) (Darbra, Crawford, Haley, & Morrison, 2007) (IALA, 2012) (IMO, 2004) (Mikkers, Henriqson, & Dekker, 2012) (Herberger, o.a., 1994).

New advanced technology puts new demands on the pilots to be familiar with different makers' software in a way that doesn't lead to the safety risk that is combined with on job training instead of training programs (Herberger, o.a., 1994).

### 3 Method

The data in the thesis is provided through a literature review and the qualitative research method interviews that provide detailed data. The interview will be used as a compliment to the literature review so that the risk of overlooking some answers can be ruled out.

The type of interviews that has been used to collect data is a structured interview, this means that a list of prepared questions will be asked to the participant, and they are able to answer the question with their own words. This type of data collecting method is ideally suited to experience based questions (Braun & Clarke, 2013).

Questions that the literature review and interviews is going to answer is;

- What skills are needed for a competent port pilot?
- How do you acquire these skills?

Pilot interview participants was selected on Finland's VTS station based on experience and availability during their normal working day, the pilot that was selected had more than 35 years of maritime experience. The results are based on analysing notes taken during the interview, additional notes were added after listening on a play back of the interview. The result of the interview is shown in a table.

The literature review documents has either been provided to us from our tutor, google scholar's database, Chalmers Library database or Google with the search words Pilots, Piloting, Port pilotage, Lotsning, IALA, IMO, Swedish pilotage and Svensk lotsutbildning. The chosen documents have been selected due to their relevance to the research questions.

Those answers that are found in the literature review are analysed and compared in a table to look at if there are any similarities between what the different documents describe as key factors to be able to start the pilot training, and in what way they suggest is the best way to acquire skills.

## 4 Result and tables

### 4.1 Result table for literature review

Table 1.

<b>Questions/ report names</b>	Transportstyrelsens föreskrifter och allmänna råd om lotsning (Transportstyrelsen, 2012)	Safety culture and hazard risk perception of Australian and New Zealand maritime pilots (Darbra, Crawford, Haley, & Morrison, 2007)	IALA pilotage authority forum report on best practice for competent pilotage authorities (IALA, 2012)	Recommendation on training and certification pilotage authorities (IMO, 2004)
Which skills are needed for a competent pilot?	Practical, safety and theoretical exam taken by a CPA.	Experience as a master. Communication between pilots during operations.	Experience. Previous education. Medical fitness. Communication and co-op between pilots.	Experience and communication
How do you acquire these skills?	Not available.	Experience acquired prior to education	Prior to education. During training in theory, simulator and scale models.	Practical observation, simulation and classroom instruction

Table 1 shows what each investigated document explains as the most important skills you need as a pilot and how they think that you should acquire them.

Table 2.

<b>Questions/ report names</b>	Present pilotage practices in Finland (Lappalainen, Kunnaala, & apaninen, Present pilotage practices in Finland, 2013)	Managing multiple and conflicting goals in dynamic and complex situations: Exploring the practical field of maritime pilots (Mikkers, Henriqson, & Dekker, 2012)	Minding the Helm: Marine Navigation and Piloting (Herberger, o.a., 1994)	Effectiveness of Pilotage (Lappalainen, Kunnaala, Nygren, & Tapaninen, 2011)
Which skills are needed for a competent pilot?	Communication skills.	Communication and experience	Updated technical skills. Communication whit tugboats. Professional, discipline. Area conditions knowledge.	Not available
How do you acquire these skills	Not available.	Not available	Simulations, computer and manned scale models Previous marine experience.	Not available

Table 2 shows what each investigated document explains as the most important skills you need as a pilot and how they think that you should acquire them.

## **4.2 Result for literature review**

Based on the literature review in table 1 and 2 it is clear that communication, area knowledge and experience is the three biggest parts off being a safe and effective operational port pilot.

The social structure on a bridge team is hard to acquire during the pilot education and is self-taught during either on the job practise, going with a well experienced pilot, or by previous marine experience. A big part of the communication is not just about social skills practiced in the bridge team, it is instead communication and cooperation between pilots and tugs during piloting missions (IALA, 2012) (Darbra, Crawford, Haley, & Morrison, 2007). (Mikkers, Henriqson, & Dekker, 2012) (IMO, 2004).

Five of the eight documents states that experience is one of the most important skills that pilots need before starting their career as port pilots and experience is in all five cases this is based on previous maritime practice as senior officer (Darbra, Crawford, Haley, & Morrison, 2007) (IALA, 2012) (Herberger, o.a., 1994) (Mikkers, Henriqson, & Dekker, 2012).

Expert geographic and ship handling knowledge is the main service that port pilots assist the vessels bridge team with and is acquired at school in simulators, scale models and during on board training (IALA, 2012) (IMO, 2004) (Herberger, o.a., 1994).

Both updated technical skills and medical fitness is stated as important aspect of providing a safe pilotage, the technical skills updates are provided by the CPA, but the medical fitness is up to each pilot to acquire and maintain (Herberger, o.a., 1994) (IALA, 2012).



### 4.3 Result table for interview

Table 3.

Question	Pilot 1 answers
Which skills are needed for a competent pilot?	Area knowledge. Manoeuvring skills Technical skills continuously updated during assigned education periods. Social skills.
How do you acquire these skills	Previous experience working as an officer. Working experience during your piloting training. Continues courses to keep you updated whit the latest technical skills.

*Table 3 shows the interviewed pilots own thoughts off which skill he uses and think are the most important aspects of the job, and how you best acquire these skills.*

### 4.4 Result for interview

Our interview result is shown in table 3 also acknowledged social, communication skills, area and handling expertise as well as updated technical skill as the most important abilities that the port pilot uses in the harbours when preforming high risk manoeuvres.

The most important experience you can get before starting the piloting program is to work as an maritime officer to be provided with communication experience and to get a understanding of how different peoples from different cultures work. How the communication between captain and pilot works.

Area knowledge and ship maneuvering skills are best taught while doing on work training, working on the bridge with a well experienced pilot, the interviewed pilot did not agree with the literature review that these skills can be obtained by using manned scale models and simulators.

The importance of updated technical skills increases with growing ship sizes, refreshing and update courses is mostly provided by different IBS software companies.

## 5 Result discussion

Based on what our result has shown in the interview and the literature review, experience, communication and knowledge about the pilotage area, seems to be the most important skills that pilot require to make a successful pilotage in a safely and efficient way. Pilots in Sweden and Finland gain their experience by working as a captain before they enter the pilot program. The Finnish pilot we interviewed stated that in his mind, the best way to gain the necessary experience is to work as an officer on vessels, this statement is supported by the result of the literature review.

Despite that experience is considered by port pilots as one of the most important part of conducting a safe pilotage, the international regulations do not have the demand of previous maritime experience and only recommends previous experience. At the moment, it is up to each nation to interpret the IMO resolution A.960 to adopt the demands that pilots need to get their license (IALA, 2012) (IMO, 2004).

USA has no national requirements on any experience before you start the pilot program and this might be a problem. Without any experience from working on vessels it will be much harder for the pilot to feel the social structure and how to act and communicate on each vessel (American Pilots' Association, 2014).

We think that communication is something that you evolve the more you use it. If you have long experience as an officer you get a better understanding of how to use the communication in a bridge team on a vessel. It is important that the communication between the pilot and the captain or officer on watch is working well to minimise misunderstandings.

Mentioned by both one of the documents and by the interviewed pilot, is the importance of keeping the pilots technical knowledge updated with the different makers equipment, these skills need to be educated during the pilots education, and then continuously throughout the pilots career to eliminate the on-job training risks. This point should be included at a greater extent in future guidelines due to the growing importance of technology due to growing ship sizes (Herberger, o.a., 1994).

The acquired results are interesting but needs to be supported by a more extensive investigation. The result of this could then be used as input to a quantitative follow up study to provide an opportunity to possible make any generalized conclusion about the result of the research questions.

## 5.1 Method discussion

During our planning phase of the thesis, we decided to go for the focus group as our leading method to provide us with results, due to the advantage of a natural group dynamic where the participants can challenge and question each other (Braun & Clarke, 2013).

A focus group would also have the benefit of addressing a wider range of views, perspectives and understandings of a question compared with interviews, the group environment can also help the participants feel safe and supported to speak more freely within a known group, this can result in a positive interaction between participants and lead to new and detailed data (Braun & Clarke, 2013).

Due to a lack of participants, the focus group had to be discarded as a method and we could only apply our research questions in one interview and a literature review based on our research questions. The results reliability is limited by the few interviews that was compared with the literature review, but the result of the literature despite only one interview was confirmed.

There are some big advantages when using interviews as data collecting method as well, such as well detailed data, the researcher has the control of the probability of producing useful data and the researcher are able to be flexible when asking the questions to look at new perspectives (Braun & Clarke, 2013).

The results of the literature review is providing a good view of how international and national authorities think that pilots should know before and after their training, but does not offer a view of what the pilots think is needed before initiating their training and what they lack in their education.

To give the thesis further support in the result of what the pilots think they need, we manage to get one interview with a well experienced pilot in Helsinki, Finland. The pilot's answers supported the literature results but any conclusion of this must consider the limits of only having one interview in Finland.

We do not believe that more documents in the literature would have provided a different result, but are not sure if more interviews could have pointed at other skills than what have been shown in the result part. We would like to increase the thesis validation with at least one more interview in Finland, and two in Sweden to get national widening and a backup interview that could support the first interview.

## 6 Conclusions

We had two questions that we wanted to answer when we started this essay. The questions were about what skills port pilots need and how to acquire these skills.

When we wrote our result and discussion we found out that some skills that are more important according to experienced pilots, are also shown in national reports that show what the minimum educational and experience demands are to be allowed to start the piloting program, and what kind of skills a port pilot needs to perform pilotage. The skills were:

- Knowledge about the pilot area
- Previous experience as officer
- Communication on the bridge
- Updated technical skills

You gain the area knowledge from the education during classroom instruction, simulation and also through practical experience on board vessels in piloting conditions, under close supervision of experienced pilots.

Experience and communication skills are gained when working as officer on a vessel. When working in a bridge team you have much co-operation between the other officers on board, and see the pilots working.

Updated skills should be obtained during assigned training moments by IBS makers, but it is hard to find makers that are willing to provide this to the pilots.

The International regulations recommend previous maritime experience as an officer, but don't demand this.

### 6.1 Future research

One conclusion made during the interview and that is reflected in both the background and result part is the necessary updates of technological progresses for pilots. This includes new software updates of different IBS makers, as well as education of new parts that is introduced to the bridge environment.

A future bachelor thesis could address the question of how often the pilots receive updated training in the different IBS makers software's, and if there should be a safety demand from the industry that the IBS makers have an obligation to keep the pilots updated if they change their software.

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## Appendix