

Transport informatics in coastal areas



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1. Introduction/background

Maritime transportation is an essential part of the global transportation network. Approximately 80 percent of all the goods are transported in the sea somewhere along the supply chain (UNCTAD, 2021). The world is dependent on shipping and that the supply chain works in an efficient way. Some areas are more trafficking like big routes where vessels are transporting goods every week. Then, there are smaller rural coastal areas where there are just small vessels that are transporting the goods to people on small islands in the archipelago. The problem in those areas is that the supply of transportation solutions are limited and the frequency of the vessels are not that high, especially during winter time.

According to di Crosta et al. (2021) it has been shown that during the COVID-19 pandemic, the purchase for e-commerce from customers have increased. This could be a problem for the people that are living in rural areas and have ordered products online which will be dependent on how the possibilities are to deliver the product the last mile. If this trend continues to increase even after the pandemic, there has to be some solution to solve the last mile deliveries to those areas. The infrequency in those areas leads to that the ferries that are going to the smaller island need to combine passengers and goods. European commission (2007) described how the integration between passengers and goods could improve the efficiency of the supply chain. It further emphasizes that it needs to be seen as a single logistic system in order to have an efficient flow of the passengers and the goods. Some of the aspects that need to be considered are how the planning should be done regarding organizing spaces that should be used for cargo and which spaces that are for the passengers.

A solution to solve the problem with the infrequency of the vessels is to have some type of application that could facilitate the commercial vessels. This application could work like for example Uber (2022) where they are working like a mobility to connect the digital and the physical world. It could be for example if people want a taxi, they could book it through their application where a lot of taxi drivers have signed up to provide this service. The same mobility and connection could be used in those rural coastal areas where private persons that own a boat could sign up and provide the service to customers. This could be used by customers that want to be transported themselves or transport their cargo during times when the commercial ferries are not that frequent.

1.1 Research problem

The research problem that this report will investigate is how the transportation chain in the rural coastal areas could be more efficient. Today, there are a lot of problems regarding the combination of transportation for both passengers and goods. The problem is that there needs to be space available at the ferries in order to be able to transport the cargo and the passengers. Another problem is that the frequency of the ferries during winter period is not that high, which will make it harder for people living on the islands to transport their goods that they want to the islands. And when the frequency of the ferries is higher during the summer period, there are a lot of tourists that also need to visit the islands. This will make it much harder to find space on the ferries for the goods.

1.2 Purpose

The purpose of this study is to find out if there is a possibility of revealing the ferries in the coastal areas in Sweden with the help of recreational boats. Also the purpose of the study is to find out the possibilities and also the barriers with the revealing of the ferries with the help of the recreational boats. Further on, the study should find the potential solution regarding transport informatics in connection to the revealing of ferries.

1.3 Research questions:

1. What are the possibilities and barriers with relieving the ferries in the coastal areas with transportation of passengers of goods with the help of recreational boats?
2. What could be a potential solution regarding transport informatics, application?

2. Theory

2.1 Digitalization of the maritime industry

Lind, M. et al (2020) described that the maritime industry works like a global self-organizing ecosystem where information is a crucial part of the operations. The information and the sharing of information is of importance to be able to plan, organize and make the flow more efficient. It is mentioned that digitalization is crucial and can be described as “the fourth industrial revolution”. The digitalization in the maritime sector is lagging behind other sectors and therefore it is important for the shipping industry to digitize and share relevant information in order to be more efficient and reliable (Lind, M. et al. 2020). In order to improve the reliability and accessibility of the rural coastal area regarding transportation of passengers and goods, the digitalization could be improved. Re-creating and implementing ideas from other sectors is one possibility to increase the mobility in those areas. The use of for example a service application like Uber (2022) the flow could be much more efficient and accessible for the passengers and goods.

2.2 Combining transportation of passengers and goods

To make the transportation in the coastal areas more efficient, the integration of passengers and goods are important. As described by the European Commission (2007) there is a lot to consider when designing and planning how to organize the space onboard the ferries. Cavallaro, F. and Nocera, S (2022) argue that one type of solution in order to make the transportation more efficient is to use freight network integration between passengers and goods in order to maximize the utilization. Further on, Cavallaro et al. describes that digitalization could be another aspect to improve. This could be improved by the usage of combining the scheme of passenger and goods in order to be able to plan and to combine those two transportations. The use of automatic data and to analyze when the demand for the transportation and goods are highest.

2.3 Legal requirements and insurance

Another important aspect to consider is the legal requirements if some type of application should be used with private boats. Transportstyrelsen (2013) describes that vessels with the capacity of up to 12 passengers need to follow some requirements regarding safety for the passengers and personnel. There are for example requirements to have the right competence and report if there is some accident. But for smaller vessels and vessels that have capacity under 20 gross weight there is not the same requirements. Another important aspect to consider is which type of insurance the private boats have. According to Atlantica (2022) it is recommended that all private boats have liability insurance that protects the person if some accident is occurring with another boat. But if the person's own boat is damaged, it is also important to have comprehensive insurance. These are important aspects to consider if private persons will provide a service where they are transporting passengers and goods with their own boat. Another legal requirement to consider is regarding the handling of the personal data that this type of service would bring. It is stated in European Union Law (2016) that the personal data need to be protected and that the data is used in the right way. When collecting the personal data the security and safety handling is crucial so the data is not used for other purposes that intended.

2.4 Environmental

The United Nations has adopted 17 sustainability goals that should be achieved in 2030. The goal ranges from no poverty, to climate actions and life below water (The global goal, 2022). The shipping industry is contributing to these goals and some of the direct effect that shipping has is regarding goal number 13 about climate action and goal number 14 about life below water. It is important to consider

the effect that this type of taxi-boat solution would bring to these goals as private boat owners in this case will affect those goals.

According to J.F. Lindgren et al (2016) the engine type among leisure boats can also have an impact on the environment. The reason for this is that in Sweden there are according to Transportstyrelsen (2021) approximately 948 900 recreational boats who are using an engine to get forward and approximately 30% of these are two stroke engines. The two stroke engine does according to J.F. Lindgren et al (2016) have an impact on the environment since it releases 20-30 percent of the fuel into the sea because it is not being combusted in the engine and could therefore have an impact on the environment.

3. Method

The method for this study is a semi structured case study. The reason for this is because the authors both wanted to use some previous research in the area and also to conduct interviews with people with knowledge in this subject. Robert K Yin (2009) describes this as a part that could be executed in method with a case study. This report has some limitations due to the time aspect and also the limitation of the size, width and depth for the report.

The result is based on interviews with peoples that have their own boats and live in Bohuslän and/or also have some knowledge about the coastal area. To find out their thoughts and opinions regarding the research questions, some interview questions were established (see appendix). These interview questions were based on the theory part of the work together with the aim of the study and research questions. The questions for the interview were sent out in advance so that the interviewed persons could have time to prepare for the interviews. Then when the interviews were held, the interviewed asked the questions and the persons that were interviewed could talk freely around these. So, the authors used open questions to get as much knowledge as possible and not limit the interviewed ability to answer the questions.

4. Result

4.1 The transportation solution

According to the interviewed, one of the biggest possibilities is that the passengers get special transportation that is tailor made for their needs. For example if they want to travel an hour that the ferry does not cover, then they can just book a transport for this. Another thing that could be good is if they do not want to wait for the ferry or want to skip the queue, it could be possible to have special transportation. Another main advantage according to the interviewed persons is that tourists often want to see things and therefore this option should absolutely be a good thing. For example in southern Europe it is common to have tours with boats in the coastal areas. Also the tourists might feel that they want to decide exactly what they want to see and where they want to go and therefore this option might be good.

The interviewed explained that when the goods are being transported in a boat in the sea it is important that the goods are protected from weather and wind. So it should be possible to request a boat that is covered with a roof and walls that protects the goods from weather and wind. And if not possible the goods can be covered in another way, for example with plastics. This is also something that is applicable to the transport of passengers that was mentioned by the interviewed, the reason for this is because some people do not want to get wet or cold when they are being transported.

Multiple interviewed persons ask themselves, if the goods are being transported with the help of recreational/private boats, then what will happen if there is damage to the goods due to the transportation. They also ask themselves who should be responsible for the damage. It was explained that the smaller boats are often in a plastic material, e.g. glass fiber and this is a material that is more sensitive in comparison to a ferry made from metals. So it might be the case that damages occur due to transportation of goods or passengers. The interviewed proposes that insurance might be suitable that states which type of damages that is insured. This is also something that must be regulated in the page where the transport is booked. The interviewed thinks that this is something that should be regulated in the page or application where the transport is being booked. The reason for this is that the person who is performing the transportation wants to feel secure and does not want to take the risk if there are damages that occur to the goods due to the transport. Further, the interviewed explained that some boats can only hold a certain amount of weight and size. And therefore they explain it is important to have a clear scope of what the boat can handle. So to solve this, it is important that this is regulated in the page where the transport is being booked.

4.2 The boat

The interviewed persons explained that the size of the boat should be determined based on request but also based on how many passengers there are and/or the type of goods. For example, a large number of people should also feel secure and feel that they are being transported in a suitable boat.

The interviewed person explains that there are several cost aspects that need to be considered if this type of "taxi-boat" solution should exist. For example, if the boat usually only drives between two harbors, e.g. Tuvesvik-Käringön and the customer requests a special route, then it should be possible to take an additional cost for this. Also, the cost of the transportation should, according to the interviewed, have a basis on the cost of running the boat. To calculate the cost of running the boat, there are many different parameters that need to be considered:

- The size of the boat, speedboat or a large boat?
- The type of boat, can the passenger/goods be inside the boat?
- The type of engine, fuel consumption, service intervals etc.

The interviewed persons also explained that it could be possible to have a system where the passenger decides what type of speed the passenger would prefer. As it is in the Uber-app it is possible to choose a big car, luxury and the same system could be used for boats. So if the passenger wants to go fast, then they have to pay for it also.

Another problem for all the people that are being interviewed is the fact that it's not the same as on land when you need fuel. Out on the sea and in the coastal areas you can not fuel up everywhere. Some harbors are offering Diesel fuel for the boats but it might be the case that you have petrol and therefore you should try to find a harbor that's offering petrol which can be hard. Another aspect that the interviewed said was that there might be a big distance between the fuel station and where the boat is located, so who should pay for this extra cost. Another problem that arose during the interviews was the logistical problem when fueling the boats. This is because the infrastructure is not always the best in the coastal areas and if this type of service becomes big, then there is a potential bottleneck with queues around the fuel stations.

4.3 The safety aspect

The interviewed persons explain that it is often the case that there is harsh weather out on the sea. This means that the boat will wobble and hit on the waves and some people will feel sea sick or even unsafe. Therefore the interviewed says that it could be good if the page where the transport is being booked also includes the current weather and also some forecast. The potential passenger will then hopefully have an understanding for how the weather will look when they are going out on the sea.

Another safety aspect that the interviewed explained is if the recreational boats should drive transports in the winter ice might be a problem. The reason for this is because the boats are often made of a plastic material and therefore it cannot always handle ice in a safe way due to the fact that plastic materials can break easier than metal. Therefore, it might be better to only have transports when there is no ice at all. So, during the winter period the supply of the boats might be smaller because of this and only some boats will be able to transport during ice conditions.

The interviewed explained that there is another aspect to consider regarding the barrier with navigating a smaller boat during the night. The reason for this is many but for example it can be hard to see in the dark without good lights, radar and so on. So to solve this, it might be good that the page where the transports is being booked only has boats that can navigate in the dark when the transportation should be done during dark hours.

To have a higher security onboard the boats, the interviewed proposes that all the boats that are doing transports should have a suitable number of lifejackets on board. They also mention that it is important that there are enough life jackets for children and people who cannot swim.

The interviewed also explains that it would be good if all the boats that are doing transports are equipped with a waterproof VHF radio. They explain this as a radio where they can call for help if something is going wrong. With the help of this, the interviewed explained that the overall safety is going up.

As an inspection of cars, the interviewed explained that it can be good to have a similar system for the boats that should perform the transports. The reason for this is because otherwise you don't know if the boat is seaworthy.

The interviewed explained that it might also be good to have a requirement that all the people who are performing the transportation should have a license for it. Because there is a license for smaller boats, "Förrarbevis" which is not mandatory at the moment but could be a good thing in order to secure safety. Another reason for this is that when people will start making money from this, more people will probably come and try to do the same, people without experience and here it's even more important to have this license if this is the case.

4.4 Environmental aspects

The interviewed persons described that there are high emissions from combustion engines and this is something that we might need to change in the future. The reason for this is that there might come legislation that affects the type of the engine and therefore it is important to be one step ahead. Another aspect that some of the interviewed explained is that electric drive can be a good thing and that this can solve the fuel problem where you have to fill up the fuel tank. Because electricity is something that nearly each harbor offers and therefore you can charge up the boat there.

4.5 Application

The interviewed explained that an application for smartphones could be a suitable solution. The reason for this is that many people own a smartphone and therefore it can be a good thing to have it as an application.

The application could then look like other types of similar taxi apps that are on land, however there might be a need for more aspects to be taken into account. These aspects can for example be:

- Number of passengers.
- The seize and the weight of the goods.
- Where they want to travel.

It should also be added that the interviewed explained that the passenger who wants to transport the goods should be able to lift the goods, so it is not possible to have goods that require a crane, for example a pallet.

Another solution that was mentioned by some of the interviewed persons were that instead of creating a new application, this service could be provided by an already existing application. They described that if this type of solution were instead a part of for example Uber, then there would save a lot of time and money regarding the implementation. The money and time aspects are two of the main obstacles that the interviewed saw with the application. So, instead of investing a lot of time and money on a whole new application, there could be a collaboration between different actors. One of the interviewed also mentioned that it could be some type of collaboration with for example Västtrafik and include this type of extra service during their application. This type of service through another actor could make the implementation much faster and the provider could then get some type of service commission for every transport booked through them.

Another issue that was raised by several of the interviewed was that on the island in those coastal areas, there are a lot of elderly people living. This application solution could be hard for them to

implement and therefore it is necessary to have some sort of service for those people as well. The interviewed mentioned that there could be some type of solution where elderly people could call a phone number to the harbor where they want the transportation and then this person could help them to book a boat for passengers and/or goods manually instead. In this way, this service solution will cover all the different types of customers that need this type of solution.

5. Discussion

5.1 The transportation solution

There are a lot of possibilities that have been addressed in the result regarding the possibility to transport passengers and cargo with the help of private boats. As has been described, many of the interviewed persons thought that this could be a beneficial way to increase the frequency and flexibility of the transportation in the rural coastal areas. Also as many of the interviewed said, this transport solution may also be attractive to tourists who want to visit some place but also have some sightseeing.

The result showed that many of the interviewed thought that a type of combination of the passengers and goods in private boats would be possible. This would increase the possibility for the people living on the island in those coastal areas to be able to both transport themselves and goods. However, there are also a lot of aspects and concerns that need to be considered in this type of solution, for example to keep the goods safe during the transport but also make sure that the goods will fit in the boat before the transport is booked.

5.2 The boats and the safety

One aspect that needs to be considered is what type of boat is used when transporting different types of cargo and/or passengers. The result shows that there are different possibilities depending on which type of boat that is used when it comes to the transportation. For example, the space that is available in smaller boats and also that many of the boats are made of plastic which could be a problem if the cargo damages the boat. So, another aspect to consider is the type of insurance that is needed. As explained in the theory, there are some different insurances that are available and the interviewed also mentioned that this is something that is important to consider.

Another aspect to consider regarding the private boats is the safety of the boat. As has been mentioned, there are different requirements when it comes to private boats and commercial vessels or vessels that exceed 20 gross weight. This is something that the interviewed discussed and described. It is important that the driver of those private boats have the right knowledge and education. The need of safety equipment is also something that the interviewed mentioned. For example it is important to have enough life jackets in the boats and it could be good if all boats have a VHF (Very High Frequency), that works like a radio with good connection.

5.3 Environmental aspects

The environmental aspect is also important to consider and as described in the theory, the two-stroke is something that many leisure boats have in Sweden and this can have a big impact on the environment. So if the transports that are being conducted with the help of leisure boats are propelled by two-stroke engines, these can affect the environment negatively. So a tradeoff may be necessary to weigh the potential impact that the use of those engines will have on those coastal areas.

The environmental aspect is also something that the interview thought of and that a potential solution for the future could be for example electric powered boats. It was also mentioned that it could be a potential bottleneck when many of the boats using combustion engines need to be fueled at the same

time. The problem with this is that there are not that many fuel stations in those areas and will then be an infrastructure problem that needs to be considered.

5.4 Application

The potential solutions regarding transport informatics could be to digitize this type of service. During the interviews, there were a lot of people discussing the potential to use some type of application like Uber for common taxis. This type of solution would enable the connection between the private boat owners and people that want a transportation of themselves and/or cargo. This was considered to be an efficient way to construct this type of solution in order to make it efficient and accessible. Another suggestion that was described was the possibility to provide the service through a collaboration with for example Uber or Västtrafik. This was discussed to save time for implementing and also that their applications are already in place and recognized. An aspect to consider with this type of digital solution is that it needs to be stated what the capacity of the different boats are to be able to book the right boat for the transportation. For example the person who is booking the transport should enter the weight and length of the goods before the transport is booked. This will make the service solution and planning much more efficient since the performing part will know what they should transport in advance. An issue with this type of digitalization and service through applications was the concern for the elderly people living on the island that may not use phones or the internet on a daily basis. For those people, the interviewed suggested some type of manual handling for them could be used, for example to call to book the transportation service instead.

6. Conclusions

To increase the supply of transportations in the rural coastal areas and to relieve some of the load from the ferries, the digital service provider could be used. The result showed that the interview thought that this could be a beneficial solution in order to be able to meet the demand of passengers and/or cargo transportation. There were also some obstacles that needed to be considered in order to implement this type of solution. For example, the different boats that are needed in order to meet the demand and the insurance issue that might occur. It was also discussed the capacity of the different boats and how to book different types of boats depending on demand. Then, there were also some environmental aspects to consider regarding the two-stroke engines that are commonly used for leisure boats and the effect on the environment if the transports are performed.

The solution for providing this type of taxi service was to use some type of application where people could book the desired transport solution. This would work like a type of Uber service where people book those private boats that will perform the transportation for them. Another suggestion was to cooperate with for example Uber or Västtrafik instead of creating an own application. The benefits of this that was discussed were that this would make the implementation cheaper and more time efficient. A concern regarding the digitalisation of this service was the older people. The solution that was suggested for this was to have some type of manual handling for those people, for example booking through a phone call.

This type of transportation service solution could be beneficial for the people living in those rural coastal areas where the availability of ferries are limited. This could hopefully also lead to a better service of the transportation in those areas and also improve the efficiency for both people and businesses operating in those areas. Also the transportation service could be attractive to tourists since they might want to discover the coastal areas with a smaller boat. The application would enable people to better plan and organize the transportation of the passengers and/or cargo which would also lead to a reduced pressure on the existing ferries.

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Appendix:

Interview questions:

- What are the possibilities and barriers with relieving the ferries in the coastal areas with transportation of passengers of goods with the help of recreational boats?
- Do you have any thoughts regarding transportation?
- Do you have any thoughts regarding the goods and passengers?
- Do you have any thoughts regarding the boats?
- Do you have any thoughts regarding the safety of the boats?
- Do you have any thoughts regarding the environmental aspects?
- What could be a potential solution regarding transport informatics?
- Do you have any thoughts regarding application or any other type of booking system?