



Analysis of implementing information sharing based on maritime-related innovation platforms: a multi-stakeholder perspective

Master's Thesis in Maritime Management

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Abstract

The maritime industry has been influenced by rapid technological developments for decades which are also increasing the requirements of the industry and the maritime industry needs to rely on technological development and innovation as well. Information communication and technologies (ICT) provide various benefits to maritime management, open innovation platform as an effective form of ICT originates from innovation intermediary, playing an increasingly important role in connecting the supply and demand, promoting innovation cooperation and facilitating technological progress.

The dissemination of such open platforms and many other similar information systems is still in infancy. Therefore, research is necessary because it enriches the understanding of the maritime sector that influence the communication and information sharing in the cross-organizational information systems in this industry. The overall aim of the thesis is to understand the stakeholders' attitudes to the maritime open innovation platforms especially on the needs and expectations of platforms. Also, to detect the barriers of maritime-related platforms and further give policy implications on the developers of platforms. Based on current research on innovation eco systems analyze a case OIP from a stakeholders' perspective thereby identifying strengths and weaknesses to recommend general changes to the case OIP, both functional and strategic.

Keywords

Open innovation platform, cluster, stakeholder, innovation ecosystem

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1. Introduction

In the introduction chapter, the background and purpose of the paper are explained. The research questions are formulated. Further, the delimitation is described, and an outline of the thesis provided.

1.1. Background of the study

The introduction of information communication and technologies (ICT) has fundamentally changed the way industries think and implement business strategies, and has led to a whole new paradigm of business cooperation (Esposito De Falco et al., 2017). In addition, researchers believe that one of the primary reasons for organizational change is technological innovation (Battistella & Nonino, 2013). With the introduction of the Fourth Industrial Revolution technologies that emphasize communication and connectivity, research and development of information communication and technologies (ICT) has been applied in many fields such as aviation, automobiles and maritime industries.

The maritime industry has been influenced by rapid technological developments for decades which are also increasing the requirements of the industry, such as energy efficiency and environmental protection (Tijan et al., 2021). To meet these new requirements, the industry needs to rely on technological development and innovation as well. Innovation is usually defined as the introduction of a new concept aimed at improving a situation, or using a new solution, or integrating technological, markets and organizational changes (Tidd, J., & Bessant, 2020). In the maritime industry, innovation is a decisive factor for the development of shipping and the success of companies (Koukaki & Tei, 2020).

It has been widely noted that information communication and technologies (ICT) provide various benefits to maritime management, such as enhancing communication and collaboration between trading partners (Ke et al., 2009), improving efficiency, supporting smooth maritime operations and creating a safer working environment (Nguyen, 2013; Zeng et al., 2020; Ke et al., 2009). The maritime sector has always been considered conservative when it comes to applying the ICT to develop new market solutions or improve current efficiency (Koukaki & Tei, 2020). Maritime business involves information exchange of documents between numerous organizations, without the maritime platforms for inter-organizational communication and information sharing will result in the low efficiency, high errors and lack of innovation (Zeng et al., 2020). With the wide use of platforms, information sharing in and out of maritime industries is on the way to be realized. It is vital to understand what drives the development of maritime platforms.

Open innovation platform as an effective form of ICT originates from innovation intermediary which can be traced back to the role of broker in the earliest agricultural and wool textile industries in the sixteenth century (Howells, 2006). Later, with the continuous acceleration of technological change and innovation diffusion, various kinds of innovation intermediaries appeared successively, playing an increasingly important role in connecting the supply and demand, promoting innovation cooperation and facilitating technological progress (Edler & Yeow, 2016). In the digital era, the global and common nature of the internet provides richer and stronger support for innovation platforms, greatly expanding the scope of innovation service targets, enhancing the diversity of innovation resource matching, and enriching the forms of innovation services (Chen & Tang, 2021).

The dissemination of such open platforms and many other similar information systems is still in infancy. Therefore, research is necessary because it enriches the understanding of the

maritime sector that influence the communication and information sharing in the cross-organizational information systems in this industry.

1.2. Research problem

At present, academic research on maritime open innovation platforms mainly focuses on the analysis of innovation supplier behavior (Ellis et al., 2012), platform operation management and the improvement of platforms (Jovanovic et al., 2021). Obviously, to promote the investment and wide applications of maritime-related open innovation platforms to enhance the effectiveness of the traditional industry and implement of the information sharing, it is essential to understand the stakeholders' attitudes to the open innovation platforms. Therefore, this research will concentrate on the stakeholders' current needs and expectations of the open innovation platforms and then give policy implications for the developers of these types of platforms.

1.3. Purpose and research questions

The overall aim of the thesis is to understand the stakeholders' attitudes to the maritime open innovation platforms especially on the needs and expectations of platforms. Also, to detect the barriers of maritime-related platforms and further give policy implications on the developers of platforms. Based on current research on innovation eco systems analyze a case OIP from a stakeholders' perspective thereby identifying strengths and weaknesses to recommend general changes to the case OIP, both functional and strategic.

Key questions:

- What is the stakeholder's contribution to the open innovation platform's goals?
- Which innovation partner gaps are there in terms of stakeholders in the case OIP?
- Which are the current stakeholders' expectations of the maritime-related platforms?
- Which are the direct and indirect barriers of platforms to realize information sharing?

1.4. Case Description: Sargasso's Process and Organization

Depending on the different developers of maritime-related open innovation platforms, they can be divided into three categories, briefly named government supported platform, stakeholders supported platform and the third party supported platform. First, the government supported platform such as TSGTTX which **provide port-related information** for all relevant parties at Tangshan port (Tangshan Port Group, 2022). Second, shipowners, shippers or other stakeholders who are involved in the maritime supply chain developed platform-TradeLens-a collaboration agreement between Maersk and IBM for **inter-organizational information sharing** for the maritime supply chain (Zeng et al., 2020). Lastly, the third party supported platform, taking SARGASSO as the example, this platform aims to **match innovation needs with solutions providers** (RISE Research Institutes of Sweden, 2021).

Since 2017, the Swedish Maritime Technology Forum (SMTF) has developed an open innovation platform (OIP), SARGASSO, built on cluster collaboration into other industry sectors e.g., material science, sustainability, building sector and food industry. SARGASSO is an online innovation platform centered on the maritime industry that matches innovation needs with solutions providers i.e., a maritime need with an outside out of sector solution, or vice

versa, e.g., a space industry solution for an offshore wind farm need. Intersective innovation goes both ways. Outside innovation match-making, the platform also hosts a yearly SARGASSO Innovation Day and a Friends of SARGASSO Development event, to create awareness of the mechanism of innovation and the open design of SARGASSO in and of itself (RISE Research Institutes of Sweden, 2021).

1.4.1. The organization of Sargasso

Sargasso is an open innovation platform, according to the instruction and guidance of ISO 56000 family, the team of Sargasso divides its innovation management into three layers (shown in Figure 1). The first layer is the Sargasso process management refer to the core team of Sargasso, who are responsible to improve the process and ensure every submitter and partner have an efficient and better user experience. The second layer is Sargasso development which is the reason to engage in the platform from partners. Sargasso denominates their partner organizations “Friends”. In this the partners are the dominant characters. They can contribute to the spreading and catching of ideas as output and input to the platform. The third layer is Sargasso Request Management which is the obligation of the partners for the daily operation of Sargasso to work, the main elements are Sargasso’s partners, and other organizations. In general, all three layers represent the stakeholders, however not all stakeholders are partners (Friends). In this definition of Sargasso stakeholders e.g., users (submitters of ideas) and the core team are included as well as partners.

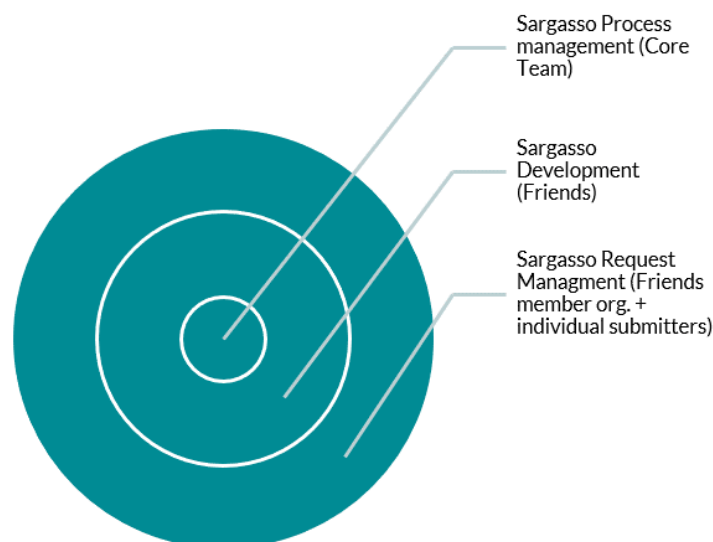


Figure 1: Three Layers of Sargasso Innovation Management

1.4.2. The process of Sargasso

Figure 2 is the summary of the process of Sargasso. The submitters can find three different form templates: RPP, RPS and Pitch in the web interface. According to the description and their own understanding of their products, they choose a template to fill and submit. Then the core team can receive the request and they review and identify whether it is the proper format and which clusters can help with this request. This step takes some time because of the need for precision. Then the ideas and requests will be sent out to the target friends. If core team receives the “I am interested” answers, then the team will transfer the information to the submitter and if submitters also think the respondents are the ideal groups, then this is a match and as “intermediary” of submitters and respondents, Sargasso will organize a kick-off meeting. Collaboration space will be provided by the Sargasso project incubator once this match is finished, it will show in the KPIs sheet. While, once anyone is unwilling to continue or the request is not matched, then submitter needs to fill the reason decline form which can help Sargasso to analyze the reasons and help to improve in future.

1.5. Delimitations

This research project was conducted in a Swedish context and based on a Swedish case-study. The Innovation eco-system might look different in other regions and countries in both Europe and Abroad. Furthermore, the study mainly focuses on third party supported OIP’s. This study is mostly based on qualitative data in the form of semi-structured interviews and the quantitative aspect of analysis is limited. This thesis is based on a single case study, but it draws from scientific knowledge through literature in the field of innovation management to broaden the applicability of the results.

2. Literature Review

This chapter of the thesis will give an overview of literature within the areas of study. Definitions and descriptions of open innovation platform and the relationship with maritime industry. The literature outlines a base for categorization within drivers and barriers.

2.1. Open innovation (OI)

In 2003, open innovation was popularized in research by Chesbrough (2003; Bigliardi et al., 2020). Since then, the Open innovation concept has attracted a lot of attention, both in industry and in academia.

2.1.1. Definition of open innovation

Open innovation was developed based on the observation of large innovative companies and their deviations from traditional innovation approaches_ (Bigliardi et al., 2020). The basic premise of open

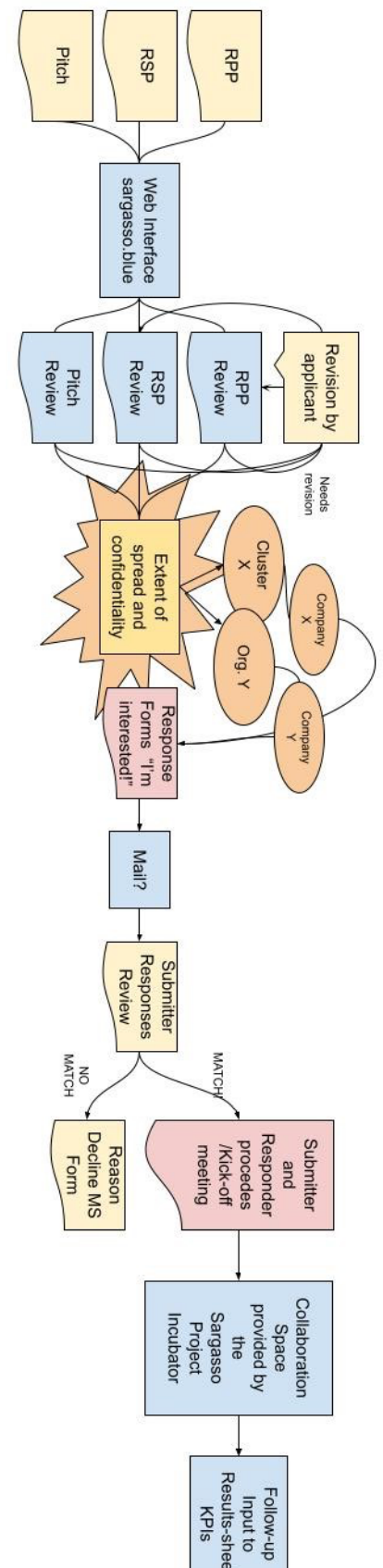


Figure 2: The process of Sargasso

innovation is to open up the innovation process. The original definition of Open innovation stressed that “*valuable ideas can come from inside or outside the company and can go to market from inside or outside the company as well. This approach places external ideas and external paths to market on the same level of importance as that reserved for internal ideas and paths*”(Chesbrough, 2003, p.43).

With the deeper research of open innovation by innovation scholars and Chesbrough, the intentionality of knowledge inflows and outflows were stressed (Bigliardi et al., 2020). They modified the original definition and it is the most commonly used one: using purposeful knowledge inflow and outflow to accelerate internal innovation and using innovation to expand external markets, respectively (Chesbrough, 2006). The first process is called inbound open innovation which refers to internal use of external knowledge and the second outbound open innovation, it refers to external exploitation of internal knowledge (Huizingh, 2011).

More recently, Chesbrough (2003) mentioned in his book, open innovation can also be defined based on business models in one sentence: “*open innovation is a distributed innovation process that relies on purposively managed knowledge flows across organizational boundaries, using pecuniary and nonpecuniary mechanisms in line with the organization s business model to guide and motivate knowledge sharing*”(Chesbrough, 2017, p.35). This definition means innovation generated by accessing, leveraging, and assimilating knowledge flows that cross company boundaries (Chesbrough, 2017).

2.1.2. Innovation Openness

As above shows, open innovation is a multi-faceted concept. Open innovation not only has several definitions, but its theories are also evolving as well. It is important to recognize that open innovation reflects much less a dichotomy (open versus closed) than a continuum with varying degrees of openness (Huizingh, 2011). The openness of innovation depends on the accessibility of potential information to third parties. (Baldwin & Hippel, 2011) argue that innovation is possible when information is a public good. As suggested by the two authors, this approach is in line with open-source logic. However, the concept of openness is a company's innovation strategy. In fact, the latter involves building alliances with external players to acquire, co-develop or license ideas, patents, or new products both internally and externally. The difference between these two approaches is intrinsically meaningful. It affects both the end of the process and the intellectual property of the innovation (Esposito De Falco et al., 2017). In an open innovation strategy, intellectual property is non-disclosed and managed through appropriate contracts between partners (Esposito De Falco et al., 2017).

2.1.3. The future of open innovation

The degree of openness of innovation shows one of the biggest challenges - intellectual property (IP). In closed innovation models, IP was initially conceptualized as a barrier: companies accumulated IP to provide design freedom to their product developers, as opposed to open innovation where IP is a new asset class that can generate additional revenue and can lead to new businesses and new business models (Chesbrough, 2017). In this new paradigm the companies will not be limited to specific projects or cooperation. When IP does not fit the development of company anymore then they can sell it and buy external IP which fits the business model of company (Chesbrough, 2017).

2.2. Open innovation platform

Nowadays possibilities of information and communication technologies facilitate the use of IT-based tools for integrating external innovators into the innovation processes of organizations. These tools, such as innovation communities, innovation contests, innovation toolkits, and innovation market places are subsumed under the term open innovation platforms (OIPs) (Stefan H. Hallerstede, 2013). The open innovation platforms (OIPs), one of the most advanced and most recently diffused collaboration models, useful for aggregating different members in an innovation community and for opening up the innovation process of companies.

2.2.1. Background on OIPs

Combining Open Innovation and Platform creates the term Open Innovation Platform (OIP), which indicates that the open innovation process is supported by an IT system (De Roche et al., 2021). Thus, an OIP is "a virtual environment to facilitate the interaction among organizers and innovators" (Stefan H. Hallerstede, 2013). In OIPs, stakeholders contribute and collaborate on ideas, propose new concepts and trends, present solutions to win challenges and answer companies' needs (Battistella & Nonino, 2013).

2.2.2. Examples and characters of OIPs

Open innovation platforms ensure access to a large number of users which take an important position in the open innovation process (Troise et al., 2021). The users are from both demand and supply side. After the exploration and study of seven OIPs (which are shown in Table 1), the author divides OIPs into two general categories. One paradigm is that users are invited to take part in online innovation projects and contribute to these initiatives. The users could be professional and knowledgeable individuals, clusters, or research institution etc. who are also called innovators or problem solvers. Another paradigm is that users meet problems in self-development and need innovative solutions to improve. Then they submit the innovation request and wait for responders. In this situation, the users could be small and medium-sized enterprises (SMEs), startups, and well-known enterprises etc. OIPs support the development of community, promote the interaction among all kinds of users and make sure a multitude of initiatives and projects.

Table 1: Examples of third party supported OIPs

Name	URL	Type	Types of customers
Wide Ideas	https://getwideideas.com/	General OIP provider	Companies
TOOL Spawn	https://toolspawn.com/	Maritime OIP	Startups, individual
Innoget Cloud	https://www.innogetcloud.com/	General OIP provider	Academia, companies
SOLVED	https://www.solved.fi/	Open Competence	Companies, individual
Manufacturing Guide	https://www.manufacturingguide.com/en	Manufacturing OIP	Companies
Materials Connexion	https://materialconnexion.com/	Materials Library	Companies
NineSigma	https://www.ninesigma.com/	Innovation Intermediary	Companies

2.3. Innovation cluster

There is a growing interest in the role of business clusters in economic growth. As early as the 19th. century, Marshall (1920) argued that due to the concentration of geographical proximity

within an industrial area, firms benefit from large-scale industrial production as well as from technological and organizational innovations (Kulakova, 2014). On the basis of Marshall's theory, Porter (2008) developed concept of cluster and gave the definition: Clusters are geographic concentrations of interconnected companies, suppliers such as professionals and services, companies in related industries, and related institutions (such as universities, standards bodies, and industry associations) that compete and cooperate in a given field (Porter, 2008).

2.3.1. EU Cluster Policy

The support and promotion of business clusters in Europe has been recognized by the European Commission and other European institutions since the late 1990s (Philip, 2015). It was identified by the European Cluster Observatory that over 3000 European cluster associated companies and organizations employed about 45% of the European workforce in 2016. The concept of business clusters has gained particular importance in Europe and national policymaking in the last 40 years. Sparked by academic research by Michael Porter and other researchers, many countries have developed explicit policy frameworks for business clustering, which in many cases include access to national and EU funding and other forms of financial support. Depending on the political structure, size and resources of a country, the design of cluster policies varies from country to country (Guinet, 1999).

The European innovation scoreboard provides a comparative analysis of innovation performance in EU countries, other European countries, and regional neighbors. It assesses the relative strengths and weaknesses of national innovation systems and helps countries identify areas they need to address (European Commission, 2021). According to the European Innovation Scoreboard 2021, Sweden, Denmark and Finland are innovation leaders and their level of innovation performance is above 125% of the EU average (European Union, 2021). Germany is a strong innovator with its innovation performance between 100% and 125% of the EU average in 2021 (European Union, 2021). From 2015 to 2021, Sweden keeps running the first position in the European innovation scoreboard which (European Commission, 2021). There are two reasons for the above countries to take the leading positions in EU. First, they have long traditions of strong government intervention regarding the locations of economic activities and second, they have different approaches to implementation of the cluster concept (Sopoligová, 2017). In Germany, instead of federal, the most relevant cluster initiatives are taken at the regional level which leads to variability in clusters (Sopoligová, 2017). Denmark has national cluster policies that support national and regional clusters (Alka Obadic, 2013).

2.3.2. Cluster Policy Approaches

Atherton and Johnston (2008) indicated that there are two different basic approaches in the development of cluster initiatives in the formation of cluster policy: top-down and bottom-up approach. Atherton and Johnston (2008) explain that typically starting from a regional or national perspective, "top-down" approaches tend to use administrative units, in particular regions, as the geographical basis for clusters development policies and plans. According to the "bottom-up" approach clusters form when groups of businesses start to cooperate and through cooperation develop ties, interdependencies and trust that enable them to operate with greater economies of scale and scope (Kulakova, 2014). In short, top-down clusters initiated and controlled by politics, while bottom-up clusters which are industry driven and have no significant political control, (Sopoligová, 2017). Access to the "top-down" clustering implies an active state role in the creation of clusters. This approach in cluster policy formation, in the

EU, is shown in Figure 4. In the case of the “bottom-up” approach, an incentive for cluster policy creation comes from the business sector. This approach, in the case of the formation of cluster policy in the EU, is shown in Figure 3.

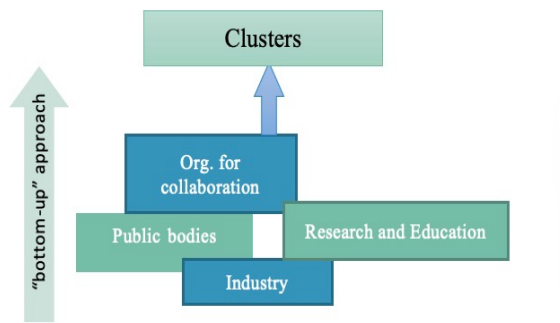


Figure 3: The “bottom-up” approach

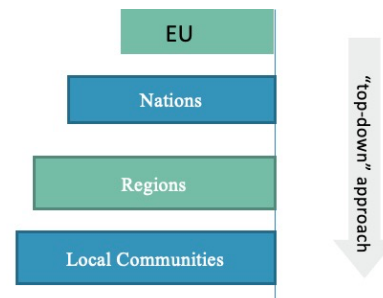


Figure 4: The “top-down” approach

Source: adapted from Sölvell (2006) and Alka (2013)

2.4. Other innovation support stakeholders in the innovation ecosystem

An ecosystem is a dynamic balance system composed of biological community and its living environment. The biological community or organisms function independently to promote their own survival. Simultaneously, their mutual interactions and exchanges lead to their individual survival (Joseph et al., 2021). There is a conceptual analogy between biological ecosystem and innovation ecosystem (Jackson, 2011). Innovation ecosystem is an increasingly popular concept usually used in business and academia which described the networked and systematic character of innovation (Bandera & Thomas, 2019; Ritala & Almpantopoulou, 2017). However, the concept of innovation ecosystem has been raising an intense argument about relevance and conceptual rigor. Edquist (1997, p.14) defined innovation ecosystem as: *all important economic, social, political, organizational, institutional, and other factors that influence the development, diffusion and use of innovations*. But this definition does not include technological innovations. Granstrand & Holgersson (2020, p.1) conducted a conceptual review and analysis then gave a new definition: *An innovation ecosystem is the evolving set of actors, activities, and artifacts, and the institutions and relations, including complementary and substitute relations, that are important for the innovative performance of an actor or a population of actors*. Innovation ecosystem integrates regional clusters, industry and technology parks, startup incubators and innovation offices to promote regional economic development (Bandera & Thomas, 2019).

2.4.1. Science Parks

Science parks are built to foster the development of innovative start-ups and regional clusters, to support scientific and technological activities, to provide infrastructure for technical support needed by young companies to grow in a competitive market, and to create networks among public and private actors in the innovation systems which are important components of the region’s innovation ecosystem (Corrocher et al., 2019; Chan & Lau, 2005). Through integration of different public and private organizations, including innovation, economic growth, and

relationship building with academia, science parks create value to their tenants (Etzkowitz & Zhou, 2017; Corrocher et al., 2019). Some empirical studies support the argument that science park can provide an environment for the new knowledge-based firms, encourage the growth of tenant firms, and promote strategic alliances and networks for community (Albahari et al., 2018; Del Castillo Hermosa & Barroeta, 1998; Siegel et al., 2003; Yang et al., 2009).

2.4.2. Incubators

Incubators are regarded as a tool to promote economic development and innovation. It is a ubiquitous phenomenon that incubators are well-encouraged by the national policy makers all over the world (Bergek & Norrman, 2008). Lacking capital and sufficient understanding of the market or having poor management could be a “final straw” for start-ups to fail (Lyons, Li, & Zhao, 2003). As a result, one of the objectives of establishing incubators is to create a supportive environment for small firms to develop in their start up stage (Chan & Lau, 2005; Cooper, 1985). Bergek & Norrman (2008, p.2) summarized four components of incubator from previous studies:

- (1) *shared office space, which is rented under more or less favorable conditions to incubatees,*
- (2) *a pool of shared support services to reduce overhead costs,*
- (3) *professional business support or advice (“coaching”) and*
- (4) *network provision, internal and/or external.*

Despite the variation of putting particular emphasis on component over time, the innovation performance of start-ups affected by incubators matter most (Peters et al., 2004; Sedita et al., 2019).

2.4.3. Innovation Offices

Innovation office is similar to incubators and science parks, also a part of innovation ecosystem. Sweden keeps taking a leading position in the area of innovation among European countries over last decade that cannot leave the national policies and support. The Swedish government established 12 innovation offices among universities (Mid Sweden University, 2022). The aim of the innovation office in universities is to “pave the way” for ideas and knowledge that are transformed to innovations and utilization. In other words, innovation offices can coordinate efforts and make it easier for students and researchers to share knowledge and ideas, connect with enterprises then support the commercialization (Chalmers University of Technology, 2022; Mid Sweden University, 2022; Stockholm University, 2022).

2.5. Innovation management

International Standardization Organization/ Technical Committee (ISO/TC) 279 prepared ISO 56000 series, the scope is “*Standardization of terminology, tools, methods and interactions between relevant parties to enable innovation*”(ISO, 2022, p.1). The innovation management family includes the following documents (Table 2) (ISO, 2022b):

Table 2: List of international standards for innovation management

#	Standard Code	Standard Name	Status
1	ISO 56000:2020	Fundamentals and vocabulary	Published
2	ISO 56001	Requirements	Under development
3	ISO 56002:2019	Innovation management system	Published
4	ISO 56003:2019	Tools and methods for Innovation Partnership	Published
5	ISO 56004:2019	Innovation management assessment	Published
6	ISO 56005:2020	Tools and methods for Intellectual Property Management	Published
7	ISO 56006:2021	Tools and methods for strategic intelligence management	Published
8	ISO 56007	Tools and methods for idea management	Under development
9	ISO 56008	Tools and methods for innovation operation measurements	Under development
10	ISO 56010	Illustrative examples of ISO 56000	Under development

Under the guidance of ISO 56003 tools and methods for innovation partnership, the potential partners can be divided into two general directions- internal and external. Below Table 3 shows the examples (including but not limited to) (ISO 56003:2019, 2020):

Table 3: Potential partners examples - internal and external sources

Internal	External
organization's own documentation	customer and end-user feedback/needs
supply chains	Competitor supply chains
procurement chains	clusters and networks
innovation department	industry associations
Manufacturing	regulations and standards
Finance	publications
intellectual property	databases of patents and IPR
R & D departments	universities/professors/consultants

It is worth noting that ISO 56002, ISO 56003, and ISO 56005 are especially important to an OIP in their management.

2.5.1. ISO 56002

The release of innovation management system standard provides reference for enterprises to establish and improve innovation management system, improve innovation performance, and control innovation risk (ISO, 2020).

In general, this part of the standard treats innovation management and is thus relevant to most actors in the innovation system. This document can be applicable to organizations and relevant parties who want to manage the innovation activities in a more effective way (ISO, 2020). For the users, customers and policy makers, ISO 56002 can give guidance to manage innovation capabilities and competitiveness.

2.5.2. ISO 56003

Innovation partnerships are the foundation of most OIPs and ought to be a guiding document to OIPs. This standard helps identify what is an innovation partnership (ISO 56003:2019, 2020) :

- Companies, public authorities, and organizations create innovations within framework agreements.
- Innovation partnerships are designed based on the customer's needs but are always based on trust and confidentiality.
- A central part of innovation partnership depends on the personal contacts that are formed and maintained during the partnership.

For the innovation partnership model, it can generate win-win results. Internal partners are an important part that cannot be forgotten. And Business Clusters are basically Innovation Partnerships (ISO 56003:2019, 2020).

2.5.3. ISO 56005

An often brought up barrier to Open Innovation is IPR issues, as 56005 treats this topic it can act as a strategic document in OIP-development. The role of IPR innovation can be described as follows (ISO, 2021):

- Innovation processes are centered less on individual firms and more dependent on innovation partnerships
- This increases the need of frame agreements and IPR management

3. Method

In this chapter, the method of the thesis is outlined. The research strategy and design are explained. Literature review, case study and data collection are presented here.

3.1. Qualitative content studies

Qualitative content analysis is a method of systematically evaluating text (Philipp, 2000), where "text" can represent a document, verbal communication, an image or video, and coding elements of that text to outline one or multiple interpretations that can be repeated by others. Because content is coded, content analysis is often a way for researchers to translate qualitative data into quantitative data (Elo & Kyngäs, 2008). However, content analysis is not necessarily quantitative in nature. In such cases, the "meaning" of the text is usually interpreted from the text itself (Schreier, 2019). Mayring (2000) mentioned that there are two central methods to develop the qualitative content analysis - inductive category development and deductive category application. The two methods cover different cases, the former one can be used to a totally new study or a fragmented content while deductive approach can test previous study results in a different time or situation (Elo & Kyngäs, 2008, Schreier, 2019).

3.2. Data collection, Case Study: SARGASSO

Case study is called as a functioning specific or bounded system by Robert Stake (2010) which focuses on individual unit such as a program, an individual organization, an activity or a situation (Range, 2021). The goal of a case study could be investigating a contemporary phenomenon with the formats of interviews, observations, psychological testing, analysis of

reports and documents (Range, 2021). The advantages of case study include being ideal for studying certain phenomena (Coolican, 2013). The case study can obtain a rich and detailed narrative of the case that provides valuable insights into the many factors that affect development (Goldsmith, 2001).

This study is based on the maritime industry platform and a case study was designed with Sargasso innovation platform. The data is collected via interviews with representatives from affected stakeholders in the cooperation which were analyzed.

3.2.1. Interviews

The interview method was in large based on the Kvale (2012) with a semi-structured approach. A question protocol was established before the first interview (the pilot interview) and was revised as needed in the following interviews. Since interviewees represented different categories of stakeholders a number of stakeholders specific questions were developed. The questions fulfill the purpose of the study and were designed to have a thought through structure, including introduction, warm-up questions, core questions and exit concluding statement. All interviews were recorded and automatically transcribed by using Otter.ai, a software that is able to transcribe interviews (conducted in English) in real-time and then be played back with audio following word-tracking.

All interviews were conducted by the author, accompanied by a researcher in the field of innovation management, presently working on the Sargasso-platform. The summary of the interviews details shows in Table 4.

3.2.1.1. Ethics

First of all, one of the most important things is to protect confidentiality. All interviewees were preceded by a consent-form of recording and storage for the duration of the analysis work. In addition to the consent form all interviewees were told before the main part of the interview that they had the right to stop the interview at any time. The recorded interviews were saved to the author's local hard drive and the transcript could be deleted at a time of interviewees' choice. In the question guideline, the possible consequences of interviewees were fully considered. When the interviewers had to make on-the-spot decisions about follow-up questions, the sensitive or involving business secrets questions were avoided. Lastly, considering the time and effort of the interviewees, all the interviews' durations were under one hour.

3.2.1.2. Demography

Demography usually refers to the statistical study of human populations (Lee, M., & Schuele, 2022). Demographic information in research can provide data about participants and their detailed characteristics which can help the researchers to confirm whether they are the target groups and representative sample (Lee, M., & Schuele, 2022). In this study, the interviewees were selected to achieve a representative spread of the Sargasso stakeholders. One pilot interview is conducted, the interviewee is one of the founders of Sargasso. After this pilot the question protocol was somewhat updated.

All different categories of stakeholders were represented in the conducted interviews. Half of the interviewees had their background and current position in the maritime sector and half of them in other sectors. The age of the interviewees ranged from mid 30 to mid 60. The average age is 45. Out of the 12 conducted interviews 2 were women. Not all of the interviewees were

responsible for send-outs, but all were the main contact point in terms of ideation, development of Sargasso. In general, most were senior position of managing directors of their respective organization.

Table 4: summary of interviews details

#	Role	Date	Duration	Notes	Sargasso Experience
1	Unit Manager (Pilot)	2022-02-22	55min	Research Institute	Friend
2	Cluster Manager	2022-02-24	34min	Maritime Business Cluster	Friend
3	Project Manager	2022-03-03	54min	Business Cluster Packaging	Friend
4	Project Manager	2022-03-09	57min	Business Cluster Food	Friend
5	Innovation Manager	2022-03-11	35min	EU-project	Financial Support
6	Professor	2022-03-14	28min	Maritime University	Friend
7	Cluster Manager	2022-03-15	52min	Business Cluster Infrastructure	Friend
8	Project Manager	2022-03-15	22min	EU-project / Maritime Business Cluster #2	Friend / Financial Support
9	Researcher	2022-03-31	35min	Research Institute	Submitter
10	CEO	2022-03-31	38min	Eu-project / innovator	Submitter
11	Cluster Manager	2022-04-06	28min	Maritime Cluster / Financier	Financial Support
12	Innovation Manager	2022-04-07	40min	Maritime Science Park	Friend

3.3. Data analysis

Analysis of data was conducted iteratively after the fourth interview. The main model of analysis was adopted and combined from Miles, Huberman and Saldana (2018) and Braun & Clarke (2008). Transcriptions were stored in the Otter.ai platform but Excel was used to store specific quotes and parts of the transcription relevant to the corresponding theme. The analysis flexibly applied the six phases which are shown in the Figure 5.

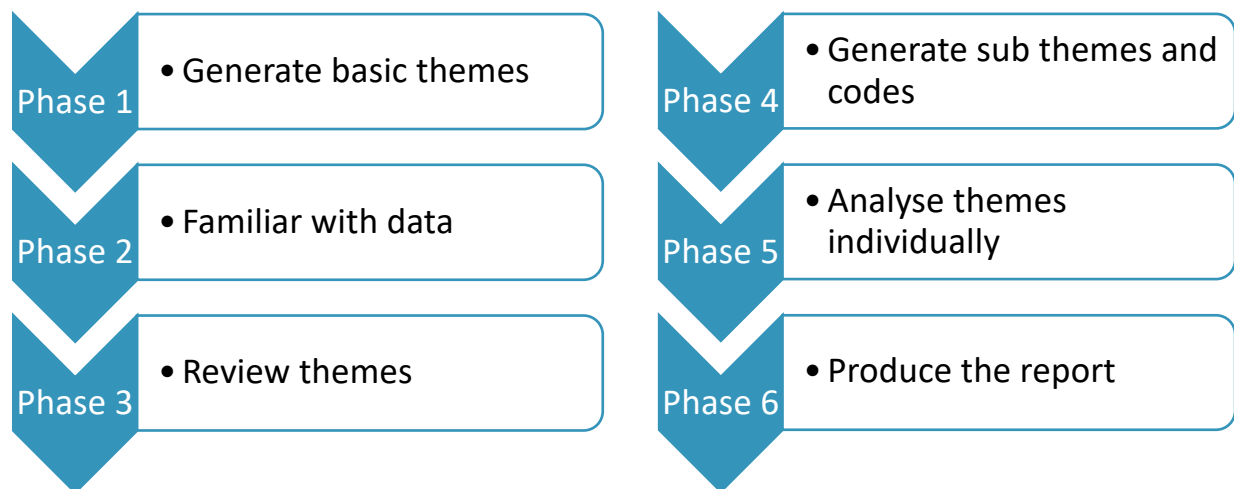


Figure 5: Rearranged according to (Braun & Clarke, 2008) and (Miles et al., 2018)

Firstly, before any interview basic themes based on the literature review and research questions were established. Then read and reread the transcribed data and become familiar with it, writing down the initial ideas. And each interview was then analyzed separately with new themes emerging.

As themes converged from many interviews the themes were added with sub-themes and simple codes. Next, all themes were analyzed individually, and associated quotes were revisited. Finally, selected the compelling extract examples and quotes and conducted the final analysis and related back to the research questions and literature, finished the thesis work.

About half of the interviews were analyzed with the Sargasso affiliated researcher and half by the author alone.

3.4. Literature Review

The literature review is conducted by focusing on a systematic keyword search in data-based including Google Scholar, the online library and database of the Chalmers University of Technology, where both newly published papers and older literature were given same preference. Key words of the research included “open innovation”, “open innovation platform”, “maritime platform”, “innovation cluster”, “innovation ecosystem”, “innovation management. Based on the findings from the systematic literature review, the chain-search method – due to the emergence of subcategories and influential authors (Nordli et al. 2002) - was used to identify further resources using the reference list of the initial papers (Figure 6).

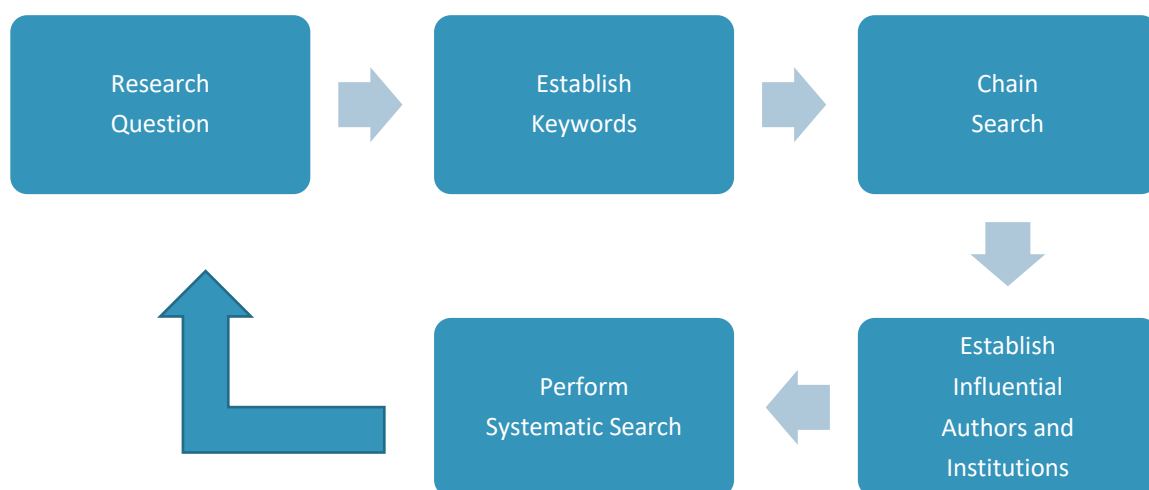


Figure 6: Description of the search methodology used in this research (Nordli, 2002)

4. Result and Analysis

This chapter treats the results generated in by case-study as well as the analyzed data.

4.1. Sargasso's Partners (Friends) contribution to the open innovation platform's goals

This section treats the “friends of Sargasso” and their characteristics and how to contribute to Sargasso's overall goals. According to the pilot interview, the goals can be summarized as:

- 1) Become a value-drive platform
- 2) Help the development of SMEs
- 3) Achieve the wide spread of ideas
- 4) Expand networking
- 5) Realize automation of process of requests

The details of friends shown in below Table 5 which illustrates the organization type that every friend represented, years of engagement with Sargasso, number of employees and cluster members in each friend and title of each interviewee. In addition, based on their properties all the friends will be divided into three groups in this chapter – academy, business cluster and innovation system support.

Table 5: Friends of Sargasso

Stakeholder's Role	Time of engagement [years]	Employees of org.	Title	Cluster Members
Sargasso personnel	3	3	Unit Manager (Pilot)	not mentioned
Cluster / Friend / Stakeholder	3	6	Cluster Manager	not mentioned
Cluster / Friend / Stakeholder	3	4	Project Manager	150
Cluster / Friend / Stakeholder	3	7	Project Manager	53
Friend / Investor / Stakeholder	3	not mentioned	Innovation Manager	not mentioned
Academic / Friend / Stakeholder	3	not mentioned	Professor	not mentioned
Cluster / Friend / Stakeholder	2	9	Cluster Manager	68
Friend / Investor / Stakeholder	2	27	Project Manager	not mentioned
Friend /Financier	3	4	Cluster Manager	13
Friend /Science Park	3	10	Innovation Manager	75

4.1.1. Academy

It is self-evident that there are gaps between industry and academia which not only exist in the maritime domain but almost every industry. With the abundant opportunities of digitalization and technology, there are a number of crucial problems that need to be solved in the maritime industry. Academic research takes a guiding role in industry development. As universities and research institutions continue to develop, academic research has been expanded in breadth, diversified in perspectives, scientific in method and richen in content.

In the group of academies, the main goals that friends can give suggestions or contribute to are (see Table 6):

- 1) Become a value-drive platform: by keeping Sargasso as a free of charge maritime-dominated open innovation platform.
- 2) Help the development of SMEs: by helping SMEs understand what innovation management is and how innovation as a concept can improve self-development and promote business.
- 3) Achieve a wide spread of ideas: by applying for joint projects together to further develop the platform and strengthening further cooperation among Friends.
- 4) Expand networking: by continuing to organize events such as workshops to give friends a better understanding of Sargasso. Another idea is introducing Sargasso to alumni who work in maritime industry or any industry which could have the interaction with maritime.

Table 6: Academy helps goals

Role \ goals	Value-drive Platform	SMEs Development	Idea Spreading	Networking
Unit Manager	free of charge	understand "innovation"		workshop/activities
Professor			apply for NIF	alumni
Researcher			further cooperation	

4.1.1.1. University

The research directions in this “friend university” usually focus on most contemporary issues, such as decarbonization, gender equality, COVID-19 related seafarer well-being, cybersecurity, automation and future competencies and so on. One research topic is not only limited to one subject. Decarbonization in shipping hasn’t been included in the global measures until the resolution addressing all ships adopted by IMO Assembly in 2003. On the one hand, the means to achieve decarbonization could involve materials technology industry for design, interaction and economy industry for management, software engineering and computer science for supervision and report and so on. What’s more, the precious research topics and results can not only connect different industries but also provide suggestions to commercialization. On the other hand, although shipping didn’t start to implement decarbonization until 2003, other industries have already taken measures. As a result, many research findings can be applied in the shipping industry, from more mature industries in this respect.

The professors at this university have professional knowledge in their research area. Having a full understanding of innovation is a part of developing Sargasso. Professors who focus on innovation can give training lessons about innovation standards to stakeholders of Sargasso, such as ISO 55000 to ISO 56005. Not limited to innovation, any research can be brought to future cooperation.

In different stages of maritime industry development, influential research results have been completed or are being carried out in this maritime-dominated university, which plays an important theoretical guiding role in maritime.

4.1.1.2. Research institution

This research institution can be regarded as a teaching unit, a scientific research unit, which undertakes the task of training talents, but also to create scientific and technological achievements with commodity nature. Unlike the university, it cooperates with most sectors and industries, with different departments in the research field, forming a large knowledge network, which gives Sargasso a strong intellectual support. One interviewed researcher mentioned his own research - carbon capture and storage, which was initially designed for manufactory industry but now can also be applied in maritime and other industries.

4.1.2. Business Cluster

Business clusters as mentioned in literature review can strongly affect the economic growth of firms even the regions. Business clusters can help Sargasso spread ideas easier and wider. Every cluster has several or hundreds of companies to join together which forms a huge network. Friends clusters come from different industries could create more chances in great scope for cooperation.

In the group of business cluster, the main goals that friends can give suggestions or contribute to are (see Table 7):

- 3) Achieve the wide spread of ideas: by mapping out what would be the potential collaboration, such as blue economy.
- 4) Expand networking: by using networks of networks. Every cluster has its own network, Sargasso can build a stronger network with the help of clusters' networks in regional, national even international.
- 5) Realize automation: by showing the requests and projects in Sargasso webpage which can reduce the workload of manpower and make some progress on the workflow.

Table 7: Business clusters helps goals

role \ goals	Idea Spreading	Networking	Automation
Cluster Manager		networks of networks	
Project Manager	mapping out what would be the potential collaboration		
Project Manager	blue economy		
Cluster Manager			visual requests live on the webpage
Project Manager		danish maritime clusters	

4.1.2.1. Infrastructure Industry Cluster

Large infrastructure installations are both present at sea and on land, naturally there are common challenges to the sector and usually the maritime environment poses a more difficult installation and operations situation relevant to industry. The climate, energy, sustainable construction, water and sewerage and waste are some areas that need to be covered in the projects which are similar issues need take into consideration when constructing maritime infrastructures. Another agenda in this business cluster is about clean technology. It can contribute to both the land and sea environment.

4.1.2.2. Packaging and Food Industry Cluster

Seafood is becoming more relevant and is a clear example of where the packaging and food industry have an interest in the maritime industry and vice versa. Blue economy and circular economy both are popular research. By the cooperation with packaging and food clusters, two topics can bring meaningful ideas that are worth exploring: how to achieve industry 4.0 and sustainable seafood value chain.

4.1.2.3. Danish Maritime Cluster

Rather than being a collaboration partner for intersective innovation i.e., innovation through the cross breeding by different sectors. International partners within the maritime domain contribute with a different perspective both in terms of funding and culture. The project manager introduced the situation of Danish clusters: *"they took all those small clusters and merge them together in big one. So, we had three different maritime clusters in Copenhagen"*. She expressed that this kind of way can bring some advantages – maritime clusters get bigger and stronger. But on the other hand, it becomes easier to lose local grip. The Danish maritime cluster can also bring Sargasso experience in a different managerial and strategic way.

4.1.3. Innovation Support and Financier

Clusters and science parks are two “components” in an innovation ecosystem. They can help turn the ideas into the right business model, build teams and provide support to SMEs. In the group of innovation support system, the main goals that friends can give suggestions or contribute to are (see Table 8):

- 2) Help the development of SMEs: by finding good solutions for SMEs.
- 3) Achieve the wide spread of ideas: by sending out and accepting more mature ideas
- 4) Expand networking: by building consortia and organizing events to let more firms, clusters and other organizations know what Sargasso is.

Table 8: Innovation Support and Financier helps goals

Role \ goals	SMEs Development	Idea Spreading	Networking
Martime Cluster	find good solutions		build consortia
Maritime Science Park		mature ideas	organise events

4.1.3.1. Regional Public Sector Maritime cluster

Maritime clusters are a vital component of maritime industry no matter in research or projects. Non-business maritime cluster takes the responsibility to promote the development of SMEs, support potential innovation and technology and improve the competitive advantages. It invests and builds consortia which is an example for how the cluster helps SMEs. The interviewee said the non-business maritime cluster “facilitates collaboration of interdisciplinary research, development and innovation by creating collaborative research and networking platforms and creating interest for maritime research”. These characteristics can give financial and networking support to Sargasso.

4.1.3.2. Science Park

Science Park acting as a neutral enabler was founded by the local university and government and has strategic partners of authoritative regional organizations. The innovation day held by science park can give Sargasso a chance to introduce itself and spread the vision. Another point is that the departments of science park contain maritime and other areas such as visualization and printed electronics which can expand the potential partners' scope. Usually, science park is owned by local region, the cooperation with science park means the tighter connection with local district and enable infinite possibilities.

4.2. Sargasso Friends Gap Analysis

In this section, Sargasso friends gap analysis will be conducted to identify the internal knowledge and resource deficiencies required to improve the performance and perfect the system.

4.2.1. Gaps according to ISO 56003:2019

Comparing Sargasso's current stakeholders to the suggested partner possibilities (Figure 7) in Innovation management – Tools and methods for innovation partnership – Guidance (ISO 56003:2019, IDT. Sargasso focuses on cluster collaboration and as such the category of "Business Clusters" is heavily represented. RISE could be said to fit in the category of "Technical Centers" as well as "R&D Labs", while the "Customers" are the submitters. There are of course "Competitors in the form of other similar OIPs, and "Suppliers are connected in the members of the cluster organizations. There are several types of Stakeholders that are not part of the Sargasso platform. Sargasso is not connected to other OIPs for their development i.e., Networks. Nor are IPR offices connected, standard organizations, public authorities, agents, or banks.

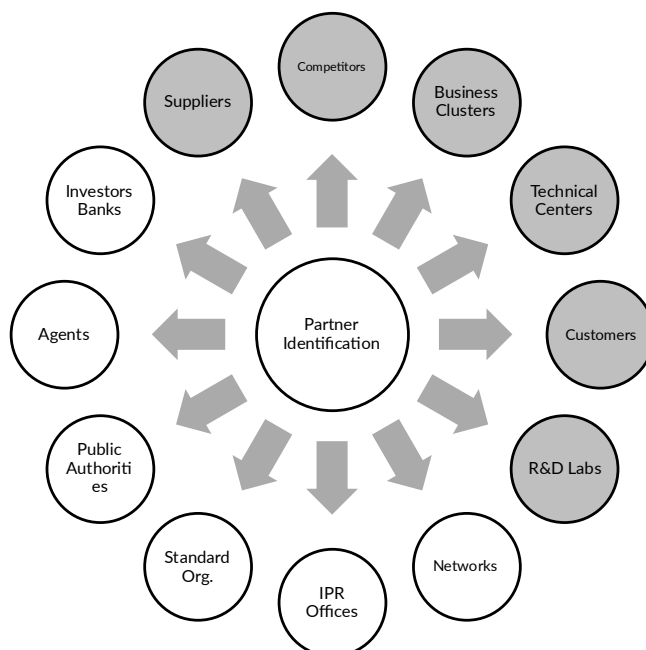


Figure 7: Sargasso potential partners, adapted from (ISO 56003:2019, 2020)

4.2.2. Gaps according to the Swedish Innovation Support System

According to the Swedish innovation Support System (Government Offices of Sweden, 2022), there are four main types of support organization: 1. Clusters, 2. Incubators, 3. Science Parks 4. Innovation Offices. As of now Sargasso only has representation on Clusters and one Science Park.

4.3. Stakeholders' attitudes

In this section, the results about stakeholders' attitudes of the interviews performed are presented. The answers are divided based on main codes.

4.3.1. Motivation of engagement

In the interviews with stakeholders, two main themes of engagement emerged: Direct and Indirect Value from engagement. Meaning that some of the benefits that stakeholders saw from their engagement were practical and direct whilst others were strategic and indirect Figure 8.

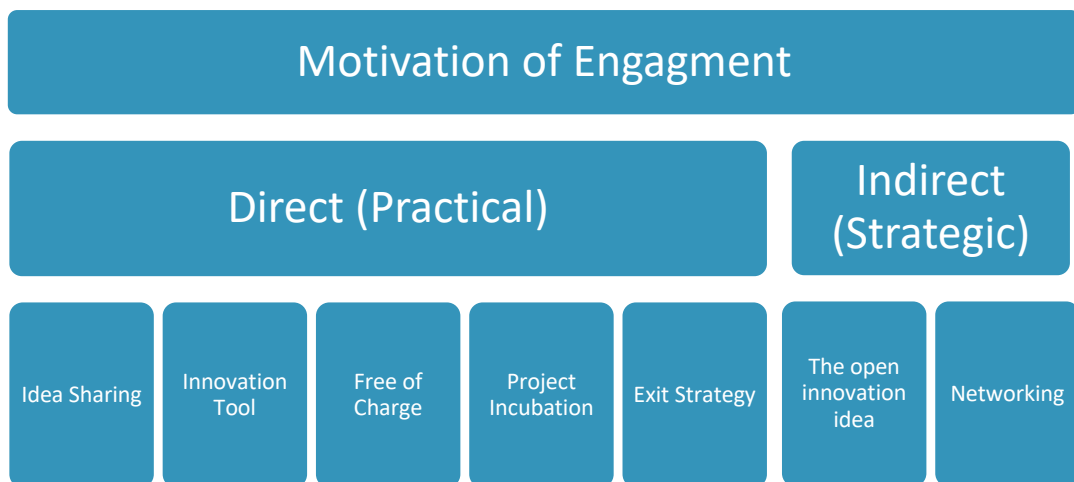


Figure 8: Motivation of Engagement Categories

4.3.1.1. Indirect value from engagement

The open innovation idea (good idea) – almost all stakeholders talked about the idea of Sargasso is great in and of itself, it is more matter of practical implementation to make it work. Everyone can realize that this is a good idea, was one of the sentiments.

Open Platform for development – many also appreciated the possibility to develop the platform together with other friends.

Promote reputation – even though many did not say it out loud, it was noted that Sargasso, being this “good idea” was a good promotional tool for the stakeholders. As a friend of Sargasso, showing on the website can bring this information: we are active in innovation and open-minded to cooperate in other industries.

Networking

- Between clusters – Interviewee stated that Sargasso help to get a sea-dominant networking. Sargasso can provide a much easier way to build a wide range of networking.
- Between companies – It is open for everyone to use. Companies usually work like two SILOs, as a result, the companies need a platform like Sargasso to see more business possibilities.

Intersective Innovation – half of interviewees mentioned that Sargasso can help with potential projects and business connection and through some EU projects, Sargasso has the chance to see whether there is an interesting product for them to participate which can also be understood as business opportunities. One interviewee also said that the intersection existed between research and Sargasso.

4.3.1.2. Direct value from engagement

Spread and Receive Ideas (Sharing) – a quarter of the interviewees agreed that Sargasso improved the efficiency of information sharing for the reason that it spread ideas through clusters which is a good way to distribute ideas and contents. Especially for some small companies, they don't have "switchboard", with the help of Sargasso, SMEs can connect to big companies and take innovation to them and create a win-win situation.

Innovation tool – only two interviewees realized and mentioned that Sargasso is an innovation tool. Sargasso gives friends the opportunity to explore and try some crazy ideas that have a working process as well, which connects companies with different challenges and so on. There are many other innovation platforms, but other clusters and companies that want to use or have the intention to cooperate have no idea who is behind the platforms. But in Sargasso, they could have personal touch and know what Sargasso is and build trust.

Free of Charge – not many interviewees stated the advantage – free of charge. But obviously, it is one the biggest advantages, everyone can feel free to use it without any concerns. Using Sargasso costs less and there is no cost on the engagement. It is amicable to startups and SMEs.

Project Incubator – only in the pilot interview, this term was mentioned. The interviewee expressed the thought that as long as Sargasso keeps running and working, the continuous ideas and projects will never stop, and innovation will continue. Even though at the moment, the idea cannot find a home, it can be kept, in the future, it may work.

Exit Strategy – this term was mentioned three times among the interviews. When a project is finished, it doesn't mean that the product ends up with the report, it also offers the possibility to develop it further. Sargasso is a bridge to something new, as an exit strategy, it can solve further questions and help with the continued research.

4.3.2. Stakeholder Expectations

In terms of stakeholder expectations Table 9 lists the found categories of expectations. They are further described below.

Table 9: Findings of Stakeholder Expectations

Network development	Engagement of Friends	Collaboration with friends	Growing the platform	Innovation	Exit Strategy	Needed response time	Connections to experts
<ul style="list-style-type: none"> Clear network development 	<ul style="list-style-type: none"> Improve engagement Firm reliable contacts (Freinds) to forward requests Continuous news from sargasso 	<ul style="list-style-type: none"> Map out potential collaboration Larger agendas&more holistic goal structure 	<ul style="list-style-type: none"> Internationally Requests 	<ul style="list-style-type: none"> Innovation standards combine with maritime issues 	<ul style="list-style-type: none"> Solve the further question Help with the continued research 	<ul style="list-style-type: none"> Make a list of possible time categories 	<ul style="list-style-type: none"> Cooperate within blue food Connect researchers to entrepreneurs and vice versa
<ul style="list-style-type: none"> Create a sustainable network Have a more broader networks 	<ul style="list-style-type: none"> Physical meetings 	<ul style="list-style-type: none"> Apply together to Nordic innovation forum 	<ul style="list-style-type: none"> Promote the ideas of EU projects Efficient administration 	<ul style="list-style-type: none"> Way of quick-testing ideas 	<ul style="list-style-type: none"> How do we get it further out 		
<ul style="list-style-type: none"> Spread sargasso to alumni Help developing countries innovate 	<ul style="list-style-type: none"> Be more familiar to sargasso Have better understanding 	<ul style="list-style-type: none"> Expects more mature ideas 					
<ul style="list-style-type: none"> Interested in project development 	<ul style="list-style-type: none"> Need for showing KPIs show good result 						
<ul style="list-style-type: none"> Help expand the publicity Build international network Information shareing 	<ul style="list-style-type: none"> More physical meetings 						
<ul style="list-style-type: none"> Use sargasso to build networks 							
<ul style="list-style-type: none"> Internationalization 							

Among the 12 interviews, the most repeatedly mentioned expectations are “engagement of friends” and “networking development”. Interviewees expect to **improve the engagement**, they hope to be more familiar with SAGARSSO: can receive continuous news from Sargasso such as good results and reports, can attend more physical meetings or events of Sargasso. About **networking development**, more than half of the respondents presented it. Letting more and more people know what Sargasso is and have a much broader networks are one way to promote Sargasso itself, this idea was mentioned in the pilot interview. While in the rest of the interviews, the main expectation is to use Sargasso to build their own networks, hope Sargasso could help expand the publicity, the networking should better be internationally – in both developed and developing countries.

"Innovation might be very blind. Maybe it is very much developed country stuff centric. I think this can be these needs to be really expanded to developing countries. We can go in digital space."

– Interviewee 6 (2022)

"Helping us in our international strategy. So, broadening my network would be nice. Helping get companies into my project, and then maybe some kind of knowledge sharing."

– Interviewee 8 (2022)

Collaboration with friends is another well discussed theme during the interviews. The interviewees had a great interest in mapping out the potential collaboration with sea and maritime industry by Sargasso. There are plentiful possible projects and areas that Sargasso and friends can work together where they can stand to benefit each other.

"Maybe we can approach to strengthen Sargasso we can apply together to Nordic innovation forum as well or that for myself in other innovation. "

– Interviewee 6 (2022)

The quote of one interviewee also mentioned the possibility of applying for a joint project, even though can only receive some “small” funds but the impact is huge.

*"And you're really looking into what are the different projects that we can do?
It should start, it should start with a good case a good integration of what can we do?
And what have we been doing?
And how can that link upwards to the larger agendas, and the more holistic goal structure? "*

– Interviewee 3 (2022)

This is a bottom-up perspective on innovation and ideation. In other words, the interviewee suggested the future and larger collaboration.

When it comes to **growing the platform**, the pilot interview suggested that the development of Sargasso should be accelerated, and the vision is to promote the open innovation platform to Nordic Europe context. And another interviewee also gave some suggestions about how to grow the platform from his experience. Firstly, we need to promote the ideas to EU projects and have the chance to become the EU hub for creating new products and bring continuity into EU projects. Secondly, have efficient administration both internal and external.

*"You need to automate as much as possible.
So that's important to try to make the digital
management of the platform as efficient as possible."*

– Interviewee 5 (2022)

What the interviewee said above is also one of the goals of Sargasso which is mentioned in section 4.2 - Realize automation of process.

Two interviewees stated the expectation about **innovation** aspects. As Sargasso is a maritime dominated platform, the application of innovation standards needs to combine with maritime issues such as decarbonization in shipping industry. Another idea came from the interviewee who is CEO in a new company. He combined the experiences and mentioned:

*" When you have an idea, and you can send it out
quite easily and get some response, but it will never fly,
because we don't have the market for it. Perhaps or and
sometimes I make various quick mock tests"*

– Interviewee 10 (2022)

It is vital to have a way of quick testing the ideas, whether it has the market or is realistic. It is impossible to send out the requests to friends and clusters without thinking about it.

Exit strategy is another theme that can be heard several times. As an expectation of Sargasso, the interviewees hope Sargasso could help them keep moving forward.

*"I'm thinking especially if it focuses on the
market part, so now we have tested a pilot at all,
we have done an innovation project, and then okay,
What's the next step? How do we get it further out? "*

– Interviewee 8 (2022)

Not only the above-mentioned market part, but the interviewee also wanted to know further development that could get companies jump aboard the ideas rather than good ideas.

*" We have European products or projects very often.
This is future research we would think that this should
be done. This would be different questions coming*

*out of the product. Where do we put these questions?
one way of doing it to send to Sargasso"*

– Interviewee 5 (2022)

What the interviewee means is that when their EU projects or products are finished, sometimes a multiple of problems come with them. Then they needed an “Exit Strategy”. They wanted Sargasso to solve the further question and help with the continued research.

There are two themes that only be mentioned once among twelve interviews. One is “**Needed response time**” and another one is “**Connections to experts**”. Regarding the needed response time, the interviewee said:

*"Doing the work of after they had defined it little bit
well, thought that they might want to close it, or
they want might want to switch out some partners."*

– Interviewee 3 (2022)

The idea is about – how long should response-times be – which really depends on the submitters’ needs. But it could be better if Sargasso sets the time guideline which benefits both users (submitters and responders) and Sargasso itself. Having needed response time requirements can improve efficiency to some extent or the projects will never have an end.

About the connection to experts, the interviewee expressed the hope that Sargasso can help with possibilities to cooperate with the blue food in other areas. They hope Sargasso can be the bridge to connect the experts in RISE and other organizations or institutions. This is the “general function” that other interviewees also agreed with, due to the fact that they lack the networking with experts who may can help them out in business. Connecting researchers to entrepreneurs through Sargasso and vice versa.

*" We had the possibility of Sargasso to connect
researchers to connect people now. Perhaps
entrepreneurs working with blue products. "*

– Interviewee 4 (2022)

4.3.3. Barriers of utilization

In the interviews with stakeholders, five main themes of barriers emerged: in practical use, funding, general, development stage and trust, see Table 10. The barriers explain the phenomenon why the stakeholders dare not to use Sargasso even if they have been introduced to it and they showed great interest in it as well? Why is Sargasso stuck in the development? And why can't Sargasso keep receiving funding from one investor?

Table 10: Summary of Found Barriers of Utilization

Direction	Barrier
Practical Use	Which ideas are valid to send?
	Trusting the platform with an idea
	Low efficiency of administration
	Complicated AND/OR unclear process
	Friends contact points
	Friends lacking resources for re-distributing ideas
	Bypassing the web-interface via mail
	Closer cooperation with the platform
	Not promoted enough
Funding	Problem - how to keep a continuous investment
	Vision - get the investment from non-profit org and last long
	Competition between clusters for both projects and for members
	Barrier from Friends members to submit due to unawareness
	No traction with consortia due to lack of current funding
Engagement	How to engage people
	How to link up projects with companies
Development Stage	Ideas themselves need a clearer endgame
Trust	RISE is not taking all projects

4.3.3.1. Practical Use

The interviewees always have the problem of understanding that kind of ideas are valid to send out on Sargasso.

It can be found that the stakeholders do not want to use Sargasso because of a lack of trust in this platform. They still have some doubts about it: whether intellectual property can be protected? Or whether Sargasso really cares about the ideas? Intellectual Property Rights (IPR) sensitivity is a main barrier to Sargasso.

There are still some handworks that needs to be done, from the process figure (shows in 4.1), the staff need to handle the requests or pitch from users then distribute them with correct industries and contact Friends and transfer the feedbacks. The staff need to take care of the answers and follow up what happens. It can take much more time compared to the automated procedure which could result in consumption of users' patience. It is necessary to find a way to deal with requests with high quality but less work.

The users who have ideas and want to find partners or solutions will visit the website and submit the requests. But the problem is that they have difficulties understanding what information needs to be supplied. The introduction on the website has a detailed description of three different formats: RPP, RSP and Pitch, but whether the users can really understand the differences among them? The complicated and/or unclear process can become a problem to Sargasso when he uses it.

Friends contact points for the need of engagement. One interviewee said requests have not been within the friends scope of competence.

Lacking recourse. One point is that it has been a little bit problematic for friends to keep up with opportunities because of lacking recourse for re-distributing ideas. And they positioned themselves as small organizations, so they do not have enough manpower to engage in all requests.

When the interviewer asked about the experience of using Sargasso, most of them said they went directly to the staff to submit requests rather than using the webpage. The problem is losing the meaning of web interface.

Since the covid-19 pandemics stroke, some organizations do not have new projects. This is an external barrier caused by the economic and social environment. The interviewee does not have the opportunities to have closer cooperation with Sargasso.

All the interviewees have the motivation to engage with Sargasso for it is a good idea and a great tool, but the problem is that it has not been promoted enough to industries that lead to no growth of friends or partners and no increase of the requests quantity.

4.3.3.2. Funding

In the pilot interview, one of the most important information is that Sargasso lost the initial funding support after three years. Therefore, the problem arises: how to keep a continuous investment from investors? And the vision of the interviewee is to get the investment from non-profit organizations which can last longer than compared to others. Another problem that needs to be considered is why Sargasso cannot keep receiving funding. Finding out the reason is vital too.

The competitions between clusters for both projects and members. The barriers from Friends members to submit due to unawareness and/or idea competition.

"But to be honest, we have a competition about the members. So, every time and that is an issue for us for this new initiative starts all the time. "

– Interviewee 4 (2022)

4.3.3.3. Engagement

It is difficult to get people engaged. People usually have their own focus. How to engage people and how to link up projects with companies?

4.3.3.4. Development stage

When users submit their requests, they are unsure of those type of concepts, but they really like how Sargasso wants to address this. The requests could be the initial and raw ideas. Mixing in more established collaboration setups and Ideas themselves also need a clearer endgame.

4.3.3.5. Trust

Who owns and operates Sargasso sometimes can be a confusion among users? For the users or partners, they thought it is a strong part or an advantage of Sargasso to have RISE and SMTF behind it. But the problem is that RISE SMTF are not always taking all the projects. Is it necessary to let all partners understand the relationships?

5. Discussion

In this chapter the results from the study are discussed in reference to the literature on open innovation and innovation management.

5.1. Stakeholder contribution towards the case OIP goals

In many of the interviews the free aspect of Sargasso was suggested as a success-factor of the utilization of the platform. Therefore, it is reasonable that it is one of the outspoken goals of the platform. As presented in Table 1 (OIP characteristics) there are many different kind of financing models of OIPs. The free aspect is believed to lower the threshold of engagement in the platform, both for partner but more importantly the submitters of ideas. Some of them are individual inventors and for them, an up-front payment would be a direct barrier to submittal. Furthermore, Sargasso wants to be a maritime-dominated open innovation platform that both draws on challenges and opportunities from its own sector as well as others. OIPs generally have this homestead in a specific sector. However, the intersective aspect fits well to include many different partner types as suggested in the ISO 56003 framework of innovation partnerships (ISO 56003:2019, 2020).

The interviews reflect one problem is that everyone knows the importance of innovation, but not everyone knows how to manage innovation to improve the development of themselves especially SMEs. As Del Brío & Junquera (2003) mentioned SMEs are a vital thrust for regional and even national economic growth. But they lack the relation ability with external stakeholders and need cooperation with networks (Pertuz & Pérez, 2021). While providing technological advice and awareness, and training programs is something that Sargasso manages to do. Helping to develop stakeholders networking and promote future cooperation with SMEs is also one of the goals of Sargasso. With this goal, the open innovation platform – Sargasso – acts as a factor in the innovation ecosystem to make the concept of innovation become a practical tool for SMEs to improve self-development and promote business.

Simply speaking, the process of Sargasso is spreading ideas. When sargasso is expanding networking can also be regarded as a way to spread ideas. But the problem is that the ideas or information cannot achieve widespread among relevant areas. One reason is the openness of the partners, as Baldwin (2011) stated the openness of innovation depends on the accessibility of potential information to third parties. The users worry about the intellectual property of their ideas then make the information unclear enough to be understood by others, as a result, the ideas die as the beginning. This is one of the biggest challenges for the future of open innovation platforms that have not gotten an excellent solution yet. Another hand of the obstruction of information dissemination exists in the platform and its partners. They are “friends” who can discuss further potential cooperation together, but it is interesting that partners’ partners have no idea about the platform. Even though, open innovation platform is to “to facilitate the interaction among organizers and innovators”(Stefan H. Hallersted, 2013), the partners only have inbound open innovation (Chesbrough, 2006) and do not dare to share the information due to the competition which is the self-explanatory reason. It causes the innovation process to be cut in the middle, the ideas and information cannot get adequate dissemination.

5.2. Partner Gap Analysis

Just like Business Clusters forms the foundation of Sargasso, there are customers (i.e., submitter of ideas) as an integral part of Sargasso. Suppliers can be said to be connected in the third layer of Sargasso. R&D labs are present in the system, but connections could be strengthened and more concrete. University and science park could be regarded as technical centers for Sargasso. Their research results or the study in technology can provide technical help. IPR office is lacked as a partner of Sargasso, but Sargasso does need the protection of it for both Sargasso itself and the customers. IPR office is a sign to customers which can bring more trust to them. Investor banks are also lacked, it can help circulate necessary funds for organization. Sargasso as a non-profit platform, the investor bank is not an indispensable partner, but it could carry some unpredictable benefits, for this reason, keeping an open-minded to partners is vital.

While from the aspect of external partners, there are no competitors to Sargasso, although lots of open innovation platforms can be found on the internet. When it comes to innovation, connecting other industries other than maritime and matching the requests makes Sargasso unique among other platforms. Standard organizations, for instance, Swedish institution for standards (SIS) is not included. If Sargasso could have SIS as a partner, then Sargasso will have a better understanding of standards and how to apply the standard to the development then both set up a reputation and extend the networking. Regarding public authorities and agents, they have not been included as the partners of Sargasso yet. Public authorities no matter which industry can benefit Sargasso in the capacities of coordination and regulatory. In the coordination aspect, public authority can manage the network, bring all the relevant parties together and span the boundary. In the aspect of regulatory, they can help with policy and give support on innovation. In some ways the OIP is much like (Porter, 2008) definition of clusters, with the same stakeholders.

Naturally Sargasso is based mainly on business cluster collaboration, and presently one Science Park is connected to the platform. However, Innovation Offices and Incubators are not represented in the Friends. It should be mentioned that Sargasso was developed based on the premise of another platform, called Translucent Innovation. Translucent, used similar collaborations but focused on Science Parks and Incubators. By omitting Science Parks and Incubators, many start-up companies are not reached by the Sargasso content. Similarly for Innovation Offices, innovators, and academics on low technology readiness levels (TRL) does not come into the Sargasso network.

5.3. Stakeholders' attitudes

Many of the expectations on the OIP ties back to Chesbrough's definition of an open innovation system i.e., using purposeful knowledge inflow and outflow to accelerate internal innovation and using innovation to expand external markets, respectively (Chesbrough, 2006). The stakeholders expected to have an inflow, that ideas were brought to the platform, from different actors' sectors. They also expected an outflow, that is that ideas came to them that matched their sector. There was also a great expectation of expanding the platform to different countries and other sectors corresponding to Chesbrough's definitions.

Regarding the overlapping parts between motivation and expectation - networking development, exit strategy and collaboration, on the one hand, it can prove the conclusion that motivation to engage is significantly associated with positive attitude and higher expectations (Muturi et al., 2013). But on the other hand, the overlaps can lead to confusion for the platform teams when they want to improve the platform. However, few studies have examined this aspect, for various

reasons that can only be speculated. One possible explanation might be that the partners are at different levels of engagement. Some of them have participated in the events and activities that are held by the platform before or already had practical cooperation and projects with Sargasso, therefore, compared to other partners who only have a basic understanding of Sargasso, they would have a higher and more practical expectations that combined with former experience. In the result of barriers of Sargasso, automation of process and trust are something that worth thinking deeper. The stakeholders would like the process to be automated as much as possible, which means a reduction in the manual work. While the trust issue asked the platform and stakeholders to have personal touch. Conflict exists and needs to have a way to achieve balance.

6. Conclusions

In this chapter the conclusions and the answers to the research questions will be presented. And based on open innovation platforms, concluding the strengths and weaknesses and giving out the suggestions.

This study employed a multi-method approach to explore the implementation of information sharing based on maritime-related innovation platforms. Twelve interviews across four relations in the case platform were conducted, and the open platform was used as an exemplar in this research.

In this case study in this thesis, four questions are listed and from the collection of data, the answers are clear. Among the interviews, all the interviewees showed great interest in the open innovation platform. People are delighted to know and accept new things which can help their projects or business in further, even though there is only in the potential collaboration stage. As the topic suggested, implementing information sharing based on maritime-related innovation platforms, it is not only the platforms' duty to achieve the information sharing and closer cooperation, but all the stakeholders also need to contribute to the development. While the case platform has the willing to help every partner and friend to get an easier way to spread and receive information and ideas, but due to the complicated relationship of business cluster and their member companies, the information sharing is more complex and difficult in this context.

The open innovation platforms are the product of digitalization and ICT, which provide opportunities for every stakeholder in the industries to increase efficiency and create business potential and give more choices. The authors hope this thesis can give all the stakeholders of open innovation platforms an overview and hope everyone can keep the open-minded attitudes.

6.1. Research question one

The first research question was: What is the partner's contribution to the open innovation platform's goals?

It can be concluded that the stakeholders contribute in many different ways. The academic partner contributes by research findings that can be applied in industry. All partners are able to teach each other on innovation standards while helping spread ideas easier and wider. The second part is the core of the OIP and maybe the most important contribution. The great difference in partner types and industries create more chances in great scope for cooperation toward an innovation ecosystem of its own.

6.2. Research question two

The second research question: Which innovation partner gaps are there in terms of stakeholders in the case OIP?

From the study, the following gaps from stakeholders were identified. The case OIP lacks essential partners to form a complete innovation ecosystem based on ISO 56003 like IPR office as an internal partner and lack of standard organizations and public authority as external partners. It was also concluded that Incubators and Innovation Offices are potential partners of the platform.

6.3. Research question three

Research question three asked: Which are the stakeholders' expectations of the maritime-related platforms?

Some of the general expectations were to grow the platform nationally and internationally, to be continuously engaged and updated on progress as well as to have more networking development: broader and clearer among partners. Such as: collaboration with potential to think of potential areas and more mature ideas. An interesting expectation and possible development of the platform was to have connections with experts internal and external. Lastly partners sought limited response time and exit strategies for their projects.

6.4. Research question four

The final research question: Which are the barriers of platforms to realize information sharing?

There were many barriers of utilization, mainly in five areas: Practical use – how day to day operations need to be improved, Funding – how the OIP can continue to retain funding, Engagement – how partners need to be connected and development as well as trust. They are all integral parts of the OIP and needs to be treaded to have a functioning platform that engages users and partners.

6.5. Implemented improvements based on results

Following the results of this study some improvements have been made to the OIP, these are described below.

6.5.1. Bundled RPP, RSP and Pitches into RCP (Request Collaboration Partners)

The complicated and unclear process in the barriers implies that the submitter cannot fully understand them. Usually, these three templates are divided according to their technical level. It is possible that users may not be able to rationalize their ideas. After submitting what they think is the correct schema, the staff receives the request and needs to analyze and identify it, and if it is overestimated or underestimated, it needs to be reworked, which results in a waste of time. It is necessary to bundle RPP, RSP and Pitches into one common format – RCP to ease use. Sargasso core team can list what the essential information is in the template and give some hint in the area where submitter may have confusion and misunderstanding, and make sure it is

“one time job” and avoid confirming the details back and forth. In that way, firstly can give a good impression to submitters and secondly it can reduce the working time and improve the efficiency for both submitters and Sargasso core team.

6.5.2. Made changes to Request form

Unfortunately, none of the interviewees have the experience to use the request form. But with the thought of RCP, the request form needs to be revised at the same time. While, because of the different kinds of requests in different areas and industries, it could take a period time for Sargasso core team to confirm what kind of information needs to be involved. The current request form which is used by Sargasso is an online filling form only have the submit button in the end, it could lose all the information once there is an internet crash, one way is to add “save” function to protect the data, another way is to create a choice to upload the relevant document such as proposal or planning report directly.

6.5.3. Generated Friends Connections Map

As the interviewees responded, they thought Sargasso was a good idea and a useful tool, but they needed more information and updated to have a better understanding of Sargasso. Similarly, Sargasso is the key character to connect both submitters and responders and is supposed to generate the friends connection map. All interviewees mapped out the potential cooperation areas with sea and maritime industry by Sargasso, if the friends connection map can be done and showed to friends which will definitely express Sargasso value its friends. The efforts of both sides and the exchange and integration of ideas can bring more opportunities for cooperation.

6.5.4. Included indicator for relevant response times

In one interview it was mentioned that it would be good to be guided more in the request form, perhaps make a list of possible time categories. So now this is being implemented into that form. The result shows that needed response time can improve efficiency or the projects will never have an end. From submitting a request to getting feedback is a time-consuming process. When a clear timeline is available, both Sargasso and submitters can have control of it. Every party can get the updated information and if not, the reminder can be set out. Keeping receiving the updates and news from Sargasso can bring reputation to itself because it can show that Sargasso is a responsible platform, it cares about the ideas and pays attention to the process and results.

6.5.5. Imitated work on a Project Incubator Function

As mentioned in the literature review, incubator supports the small companies in their start up stage. The term project incubator is inspired by incubator which is a part of the innovation ecosystem. There are some ideas submitted to Sargasso but in an “unmatched” situation. But every thought and idea worth spreading even though it cannot achieve or succeed due to limited technology or networking at the moment. Imitated work on a project incubator means that Sargasso provides a space to those ideas and waits for further cooperation and potential partners. Those ideas are similar to the startups, they need a chance to be found and developed in future.

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Statement of independent work

I hereby confirm that this thesis was written independently by myself without the use of any sources beyond those cited, and all passages and ideas taken from other sources are cited accordingly.

Appendix

1. Consent form

**Informed consent for participation in Master thesis project
("Analysis of implementing information sharing based on maritime-related innovation
platforms: a multi-stakeholder perspective")**

Chalmers University of Technology
Department of Mechanics and Maritime Sciences
Department of Maritime Studies (Maritime Management)
SE – 412 96 Gothenburg

Students:

Xiaohan Gu (guxi@student.chalmers.se /0724438418)

Supervisor:

Monica Lundh monica.lundh@chalmers.se

Peter Sjögren peter.sjogren@ri.se

I am a master student studying maritime management at Chalmers. I am currently working with RISE on my master thesis based on the maritime-related platform. This thesis aims on understanding the stakeholders' attitudes to the maritime open innovation platforms especially on the needs and expectations of platforms to detect the barriers of maritime-related platforms and further giving policy implications on the developers of platforms.

If you want more information about the project, you are welcome to contact the supervisor and/or the students.

Before we ask for your participation, we want to inform you about the ethical rules that apply in the project.

- *I have read the information about participating in the study and am aware of how the data collection is performed and the estimated time it takes.*
- *I have had the opportunity to ask questions regarding the study and have them*
- *I participate in this study completely voluntarily and have been informed about why I have been asked and what the purpose of my participation is.*

- I am aware that I can cancel my participation at any time during the study without having to give a reason for this.
- I give my consent to Chalmers University of Technology.
- I give this consent provided that no one other than the student/-s / supervisor / researchers associated with the study will take part of the collected material.
- I am aware that the study is completely anonymous and collected data will be reported without connection to person, vessel or company / shipping company.
-

By signing this form, you give your so-called informed consent to participate in the study under these conditions and that you have read the information presented.

I agree that the interview will be recorded for analysis purposes.

Place: <i>Microsoft - teams</i>	Date:
Signature: 	
Name clarification: 	
Contact information: VOLUNTARY 	

2. Examples of interview questions

- Broad questions: How did you come in contact with Sargasso?
How long have you gotten in touch with sargasso?
How is your experience of platform so far?
Can you give an example when you are satisfied with Sargasso?
And describe that situation
What motivate you to keep the contact with Sargasso?
- In-depth questions:
In the process of collaborate with the Sargasso, what kind of problem did you meet?
How was it solved?

How can this platform help you in business?
Which aspect of the platform that can be improved?
What do you hope to gain in the near future?