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O1-A3: DEFINITION OF COMPETENCES IN THE CARBON NEUTRAL SPORT MARINAS MANAGEMENT SECTOR

PROMOTED BY:

IN PARTNERSHIP WITH:

Co-funded by the Erasmus+ Programme of the European Union

SUMMERIZE INFO

PROJECT TITLE:

CARBON NEUTRAL MANAGEMENT OF SPORT MARINAS INTERNATIONAL MASTER MODULES PROGRAMME (**INCAMP**)

IO REFERENCE:

IO 1 (xxxxxxxx xxxxxxxxxx)

TASK REFERENCE:

O1 - A3

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DATE:

June 2019

DOCUMENT VERSION 1 STATUS:

V.1

This project has been funded with support from the European Commission. This publication reflects the views only of the author, and the Commission cannot be held responsible for any use which may be made of the information contained therein.

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1 INTRODUCTION

According to the *Incamp* project's goal (developing a range of skills that allow a marina manager to minimize its environmental impact while ensuring efficient management) an analysis of the current educational offer at master's level has been completed. This is going to be useful as a benchmark and a basis for the development of the new master's profile.

After having identified through a careful analysis of the training offer what are the competencies offered by the university of the European Union, it has been set the goal of understanding what are the needs in terms of skills of the port facilities. From *Our Common Future* emerges that at the heart of sustainable development there is the problem of human activities impact. According to that it has been thought that the skills needed for sustainable management in a marina should look first and foremost at the sources of pollution produced activities. *Incamp* project is mainly focus on CO2 emission, but looking only at direct CO2 emissions was a very restricted approach. In addition, the production of different sources of pollution indirectly determines CO2 emissions from, for example, the transportation of waste. For this reason it was decided to look at sources of pollution in a broader sense. In this work, an innovative approach has been developed in order to highlight the main sources of pollution and environmental criticalities in marinas industry. The idea is that the competences emerged from such an analysis are at the core of a sustainability driven management of a marina.

Below it is described the analysis of the literature carried out with the aim of acquiring new knowledge useful for the purpose of this chapter. Subsequently an innovative approach has been proposed to identify the sources of pollution and also useful to acquire a knowledge of the sector. This approach is based on Michael Porter's *value chain* (Porter, 1958) and it allows to focus on the core activities that account for the value created by companies. Next this mapping approach has been applied to five different case studies, which correspond to five different companies managing marina facilities. Ports has been selected on the basis of their size, their proximity to the University of Palermo, manager's availability and interest shown in the proposal to cooperate in this project and on the basis of the type of legal entity from which the structure is managed.

2 LITERATURE REVIEW

The study of the scientific literature was conducted with the aim of understanding which methods have been used in the past to address the analysis of activities from the point of view of environmental sustainability, which are consistent with the idea of sustainable business. Considering sustainability in a business contest as "an organization's ability to realize profits, as well as sustaining the environment at the same time" (Houy et al., 2011). More specifically, the focus of the research has been oriented to the identification of methods that allow to identify the sources of pollution. But in spite of the specific direction of the research, the opportunity to take inspiration from the articles analyzed was left open.

The research started with an article about the extension of the *PMapping* technique (White and James, 2014). The *PMapping* process mapping technique is a methodology that is part of the *lean* family of methods. In line with the *Lean thinking* philosophy, it allows to focus attention on wastes. In particular, mapping consists mainly of a classification of the activities of a given process according to its type (e.g. "operations", "transports"). The idea is that it is possible to highlight the so called "waste" through this. The starting paper extends this approach so that it is also possible to highlights and identify "green wastes" that are linked to the activities. This kind of approach has been considered very interesting since it could provide some hints to fulfill the objectives of the work presented here.

	Activity	O	I	T	S	D	G	Notes
1	Load			10 secs				
2	Process	60 secs						
3	Check Thickness		20 secs					
4	Clean		5 secs				Disposal of dirty isopropanol. (100 litres per week)	1 in 5 require cleaning with Isopropanol
5	Unload			10 secs				
6	Warehouse			100 metres	Up to 48 hours	Wtg forklift, 30 mins	Diesel fuel (100 litres per day) and forklift emissions.	Forklift being refuelled. 1,000 litres in storage

FIGURE 1 - EXTENDED PROCESS MAPPING EXAMPLE

However, it has become clear that there is a considerable lack of similar approaches in the literature. The use of keywords such as "waste identification", "green waste", "pollutants

identification", "process mapping for waste identification" or "process mapping for green waste identification" on Google Scholar search engine does not produce the desired results. In fact, they refer to articles about lean methodologies (e.g. about *Value Stream Mapping*), which however could be useful in the perspective of an adaptation of a methodology known in the literature in a green key, similarly to the paper of White and James (2014). In other cases, however, they produce results that are not useful, such as those in the field of pollutant waste treatment.

Having realized this, a different strategy has been adopted. The research was directed to those articles that had *Extension of process mapping to identify "green waste"* among the references. This led to the identification of some articles containing reviews concerning the field of GBPM (*Green Business Process Management*) and "Lean and Green" (White and James, 2014).

As far as Green BPM is concerned, several reviews of articles have been studied and it has become known which methods are the most used in the sector. Conventional *Business Process Management* (BPM) was born when researchers "instead of blaming people for underperformance, they started to blame the process" (Opitz et al., 2014). It is a methodology that consists of a set of concepts, methods and techniques that allows to design, manage and optimize processes within an organizational context (Nowak et al., 2011), thus improving the overall efficiency of the organization. The effectiveness of the application of this approach has been proved over the years to support the competitive advantage of companies (Hung, 2006). The use of BPM in a green perspective (GBPM) is an example of the growing interest in the environmental impact of business activities. But of course this is also due to the increasingly stringent environmental legal requirements and to consumers' interest in sustainability (Nowak et al., 2011). This is still a young discipline. However, the approaches that the literature classifies as GBPM are very fragmented, lack of generalizability and are strongly related to the specific field of application. What they have in common more than anything else is the goal, a more sustainable business. For this reason a universal definition of GBPM is still missing, but in general it can be considered as the use of techniques and methods typical of BPM, mostly readapted, aimed at reducing the environmental impact of processes. In other words, a method already known in the literature is "extended" and applied in a green key as shown in the following graph taken from work by Gohar and Indulska (2015).

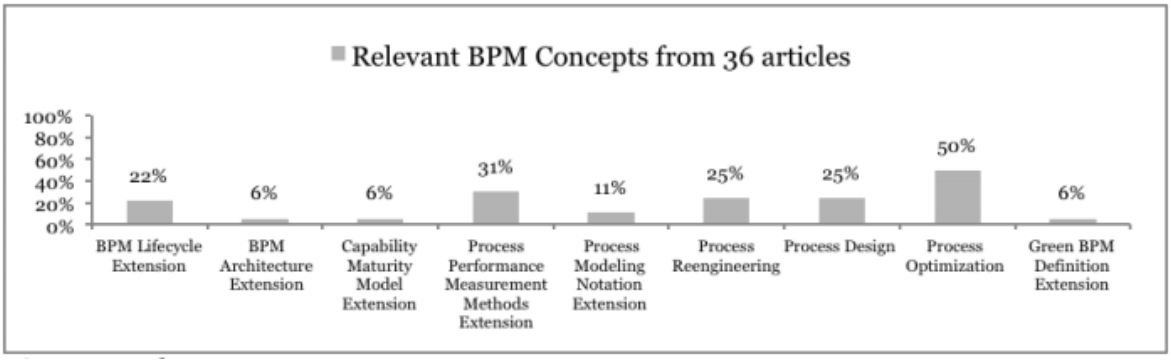

FIGURE 2 - BPM CONCEPTS IN SCIENTIFIC LITERATURE

The scientific literature analyzed consists of articles that provide a definition of GBPM, point out its differences with conventional BPM or try to make a synthesis of the approaches implemented in the past. What the articles investigated have in common is the focus on some aspects that can be considered key at this point. Strategy should be the first aspect to be taken into consideration. It is necessary to develop a "green strategy" that is consistent with the company's business strategy (Opitz et al., 2014). Nowak and his colleagues (2011) stress the importance of Porter's value chain (Porter, 1958) in considering the environmental impact of activities. In fact value chain helps in strategic decision making by highlighting which are core and support activities for the creation of value. This decision making should be directed in a sustainability direction.

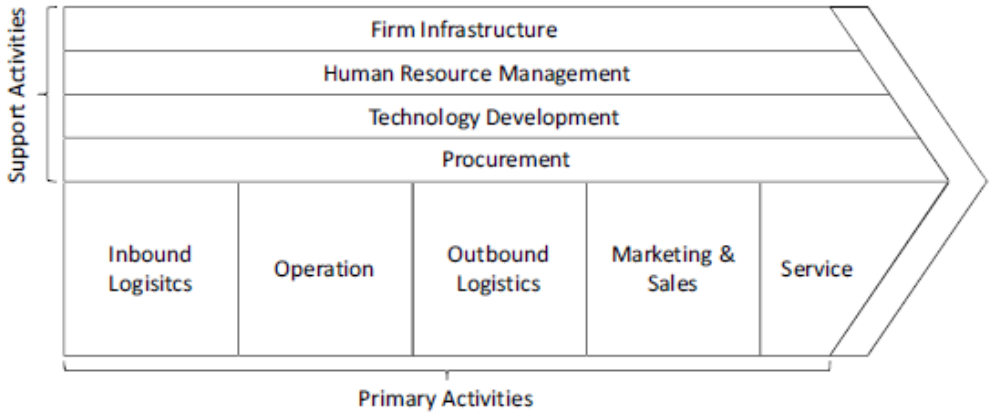

FIGURE 3 - PORTER'S VALUE CHAIN MODEL

Another recurring topic is the GBPM life cycle. Several *life cycle* models are proposed and they are basically green adaptations of the BPM life cycle, which in turn has no unique definition. In any case, we highlight the steps of BPM for the continuous improvement of processes, from the

definition of a strategy, to the design or redesign of processes up to monitoring and control. A key aspect is also that of the *Key Performance Indicators* (KPIs), called *Environmental Performance Indicators* (EPIs) in this context, because they are aimed at measuring the environmental impact of a process (Nowak et al., 2011; Gohar and Indulska, 2015). Gohar and Indulska (2015) describe the KEIs used in the literature and highlight how the mainly used EPIs are aimed at measuring energy consumption, CO2 or greenhouse gas emissions. Indicators to measure water consumption, recycling and waste management are the least used.

Another topic is GBPM modeling. It consists in the use graphic and textual rules to graphically represent a process in order to better comprehend processes, monitor them or create a base of knowledge for software development. Opitz and his colleagues (2014) defines GBPM in the following way. "The modeling is the visualization of the different workflows, resources used, connections, and responsibilities. Green modeling considers the environmental impact in the process modeling. It sets values and key factors for each unit in the company, so that every unit is able to analyze their business processes based on these ecological values and potentially optimize them to reach their green goals." This definition well represents, at least for what has emerged from the analysis of the literature, what is the main use that has been made of modelling in the field of GBPM. In other words, it has been aimed at measuring and therefore reducing the environmental impact of processes in relation to sources of pollution or waste already known. The opinion in the literature seems to be in favour of this kind of approach. It seems that GBPM modeling can really be used to reduce the environmental impact of an organization (Houy et al., 2011).

Having said that, it is necessary to refocus on what was the objective of this analysis, identifying an approach aimed at identifying waste. The modeling approaches used in the literature, as already mentioned, are within the definition provided by Opitz (2014). Moreover, they are methods that, starting from techniques already known in the literature, extend the application of the technique in a green key. Some reviews among those analyzed propose a collection and classification of articles in the literature related to GBPM (Opitz et al., 2014a; Opitz et al., 2014b; Maciel, 2017). The classifications has been performed according to the content of the articles and it has highlighted those papers in which the application of a BPM method with a green purpose is described. These reviews have allowed to explore GBPM modelling techniques.

The approaches observed are very heterogeneous both in terms of the type of technique used, in terms of the context of application and the purpose of the work. Many approaches are based on the BPMN (*Business Process Model and Notation*) or similar techniques and add to them information related to environmental sustainability. For example, one of the approaches (Recker et al., 2012) uses both a process BPMN mapping technique and symbols that identify the type, and also highlight the point of origin, of resources consumed (such as fuel or paper) and indicators that quantify CO2 and greenhouse gas emissions related to the execution of the

activities. The already mentioned article by Houy (2011) takes up another interesting case (Scheer,1994) on the mapping of a process carried out through the EPC (*Event-driven Process Chain*) technique. In the process mapping, the activities are linked to annotations that report ideal values of indicators referring to the consumption of resources (fuel, electricity) or emissions (CO2).

These methods make it possible to focus attention on the value assumed by the indicators during the execution of the activities. They are based on the idea that by trying to achieve the ideal value of the indicators, it is possible to reduce the environmental impact of the process as a whole and allow to create awareness of the environmental impact (Houy et al. 2011). It must be said, however, that these methods require a preliminary analysis and knowledge of the processes and sources of pollution linked to performed activities.

In addition to the GBPM field, the article by White and James (2014) led the research in the field of lean and green. The exploration of this field once again relied on reviews, finding in the work of Caldera, Desha, and Dawes (2015, 2017) an excellent sources of information. *Lean Manufacturing* is a strategy that includes several methods and aims to "deliver the same output while utilizing fewer inputs" (Caldera et al., 2015). In other words, transferring value to the customer while minimizing waste of resources. Also the Lean philosophy, as it was for BPM, fitted in the context of the growing attention to sustainability which has more and more been seen as a driver to increase the efficiency of organizations and competitiveness (Caldera et al., 2015). Evidence of this growing attention is the increase in the number of publications, highlighted by Caldera and colleagues (2017) in the graph below, which discuss the application of lean methods for sustainability purposes. It has also been demonstrated that the use of these methods is effective in reducing pollution, including emissions (King and Lenox, 2001).

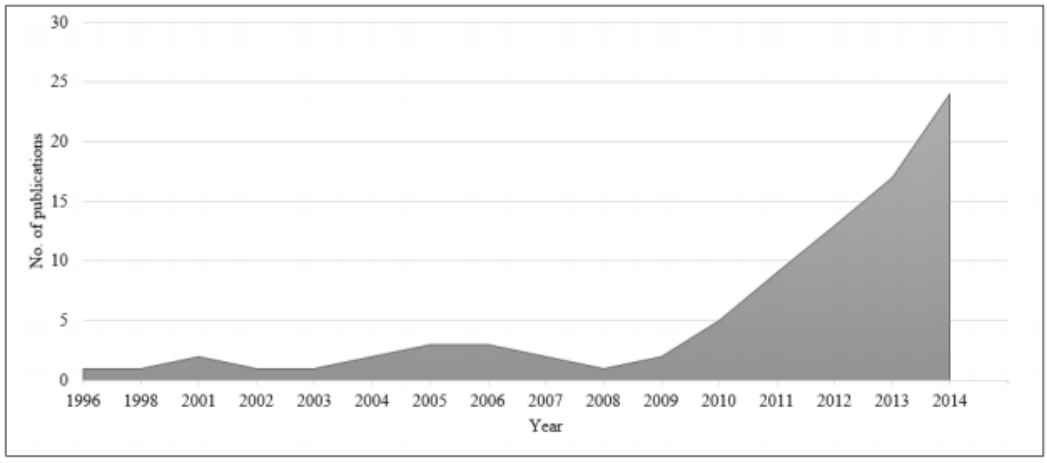

FIGURE 4 - TREND IN PUBBLICATION REGARDING LEAN AND SUSTAINABILITY

Caldera, Desha, and Dawes (2017) describe the fields of application of lean methods used in the green context. A collection of papers by method is also provided. This highlight how most of the methods used are actually conventional lean methods applied in a green context in order to reduce environmental impact of business activities, while there is a considerable scarcity of adapted lean methods.

Different lean methods have been applied in the fields of energy management, emission management, water management, chemical management and supply chain management. What is more interesting, however, is the implementation in the field of waste management, meaning both solid and liquid waste, as well as emissions. Among the methods applied there are for instance *5S*, *total productive maintenance* and *kaizen*. But certainly more interesting are the mapping methods that look more directly at processes and *value streams*.

Methods like green value stream mapping (Marimin et al., 2014), *waste flow mapping* (Kurdve et al., 2015) and process mapping in an extended version (White and James, 2014) allow to "observe and visualize the green waste point of generation and are also effective in evaluating environmental impact caused by the process activities" (Caldera et al., 2017). Value stream mapping, which is a conventional method, can be used to identify material flow and waste, to determine environmental impact and to improve environmental performance of processes (Caldera et al., 2017). *Sustainable value stream mapping* is another innovative method, adapted from value stream mapping "by recognizing suitable metrics and methods to visually present environmental waste" as Caldera and colleagues state (2017) regarding Faulkner and Badurdeen's work (2014). They also state that this method can address "raw material waste, process water waste and energy waste under environmental metrics, not captured in traditional value stream mapping", like it is shown in Brown and colleagues' article (2014).

A green value stream mapping approach is shown below (Marimin et al., 2014). In the map the stream of value is represented but information relevant for cost efficiency are substituted by environmental sustainability indicators. In this way it is possible to understand where the waste is generated and the amount of waste connected to each activity.

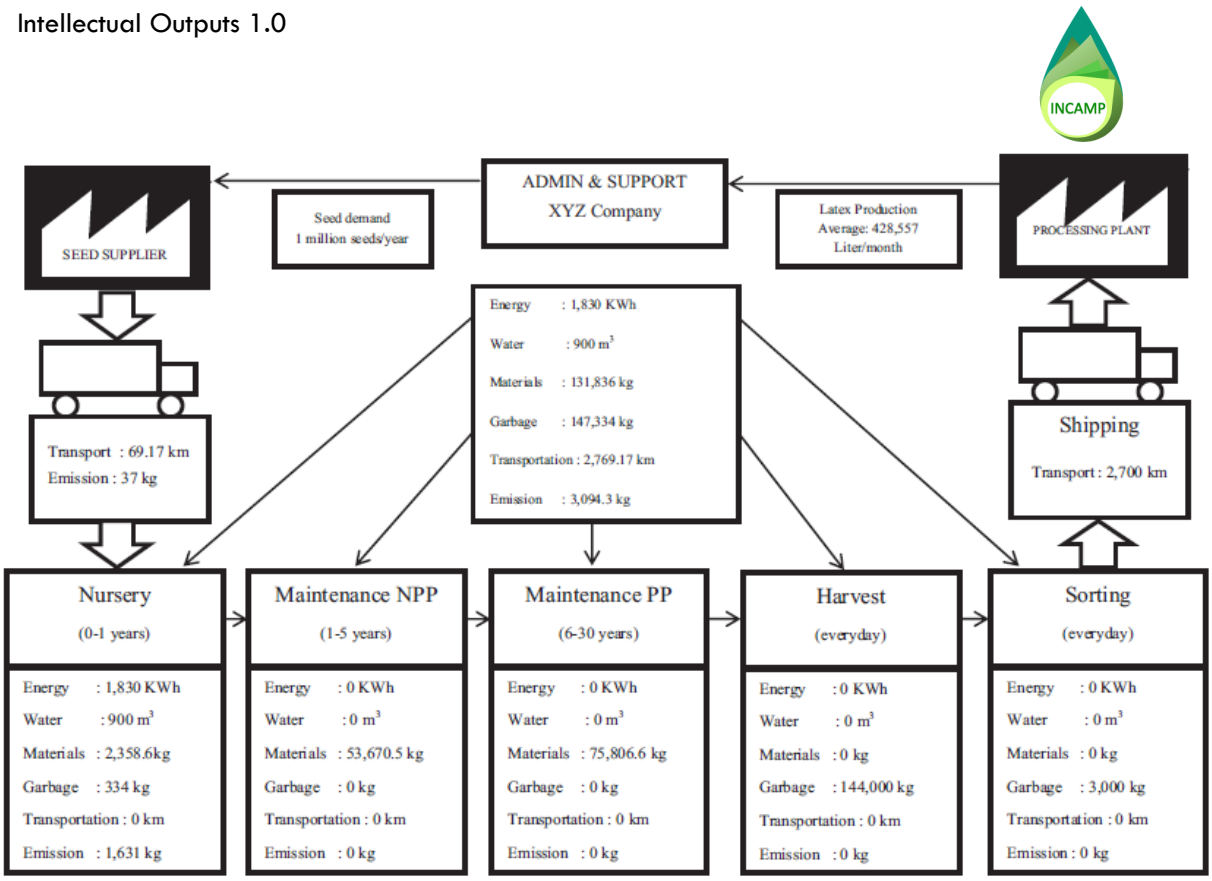

FIGURE 5 - EXAMPLE OF GREEN VALUE STREAM MAPPING

3 VALUE CHAIN BASED MODEL

The analysis of the literature performed has first of all highlighted the lack of "ready-made" approaches to achieve the aims of this work. Which is stressed to be, at this stage, related to the identification of sources of pollution and critical issues from the point of view of environmental sustainability. Despite this, methods have been identified that are in line with the abovementioned objective. The approaches that have been highlighted in the previous section have provided inputs for the conception of an innovative method. And the whole literature reviewed has been helpful to proceed towards the study of activities and processes within a green perspective.

A model adapted from Michael Porter's value chain is going to be applied to obtain a clear view of the activities carried out, of the issues related to environmental sustainability and in the end to identify sources of pollution.

Porte's model is used to describe how company creates value and what value flows are. The company in this model is represented as a set of activities, each of which contributes to creating value that is ultimately transferred to the customer. The activities are grouped into two categories:

- *Primary Activities* are directly related to value creation, you have: *Logistic Inbound*, *Operations*, *Logistic Outbound*, *Marketing and Sales*, *Service*;
- *Support Activities* do not produce value directly, but indirectly by supporting the execution of primary activities. There are the following types: *Firm Infrastructure*, *Human Resources Management*, *Technology Development*, *Procurement*.

As already mentioned, in its original version the model has been conceived looking at the structure of manufacturing companies. These are realities in which the value transferred to the customer essentially depends on the transformation of a set of production inputs into a finished product. To do this, the following activities are carried out in sequence: activities related to the management of raw materials, which can be labelled as logistic inbound; transformation activities, i.e. operations; activities related to the distribution of the finished product, logistic outbound; activities aimed at creating product demand, marketing and sales; and finally, services (service) related to the product, or its sale, which add further value. The organizations covered by this paper follow a radically different business model. All primary activities make up a value stream that is transferred to the customer not in the form of a product, but in the form of service.

Since a “Porter approach” was considered essential, it was decided to use an adaptation of the original model. The revision proposed here excludes services from the value chain because services are not a component of the value flow, but the value itself. In addition to this, another change has been adopted. Since logistics and marketing activities are in common between the various flows, it was decided not to duplicate them, but to diversify the flows only and only within the operations box according to the type of service offered. Furthermore, if the service should include several processes, a distinction is made between the sub-processes.

4 METHODOLOGY

A very practical approach has been used to achieve this goal. This approach consists in collecting the information needed directly through interaction and dialogue with the insiders and, whenever possible, through direct observation of the structures and activities. The method consists of three steps. The first step was to carry out a search of the port facilities used for pleasure boating in order to identify a set of marinas which meet the established requirements. Then, after contacting the managers of these facilities by telephone, interviews were conducted at the facilities. Finally, the information collected was processed systematically.

4.1 Selection of marinas

The search for facilities served to identify marinas to be examined as case studies. Google's Satellite maps and Google search browsers were used to carry out the search. Through the maps it was possible to identify the moorings on the coast. Through the browsers it was possible to obtain general information on the structures and telephone contacts. The ports were selected on the basis of their size, their proximity to the University of Palermo, manager's availability and interest shown in the proposal to cooperate in this project and on the basis of the type of legal entity from which the structure is managed. Small ports located within the urban area of the city of Palermo and managed by s.r.l. have been taken into consideration. The companies identified will be described in the following.

4.2 Method of investigation

After identifying the companies, an approach was developed to extrapolate the necessary information. The most appropriate method seemed to be the construction of semi-structured interviews. The structure of the interviews was built following Porter's model and focusing on environmental topics. This method on the one hand provides an essential support tool to focus on the aspects of interest, without the conversation going off track, as well as makes easier to start and stimulate the conversation. On the other hand, it leaves room for in-depth questions on topics that emerge during the interview. Given the lack of initial knowledge of the sector, this method seemed to be the most appropriate for our needs.

4.3 Synthesis of information

In the final part of the work, information obtained have been synthetized using Michael Porter's value chain model as a tool, in order to obtain a complete description of the activities carried out by the companies. However, as already said that Porter's model, having been designed to follow the structure of a manufacturing company, has been used in an version which is adapted for the type of organizations that are the subject of this work. This approach make it possible to take a systematic look at the companies so as not to neglect their key aspects. Subsequently, having now obtained a complete description of the company, taking inspiration from each activity, a green perspective has been adopted, highlighting the possible sources of pollution and waste generated by business processes.

5 CASE STUDIES

As mentioned above, companies have been selected for analysis as case studies. The companies, listed in chronological order, are the following:

- Marina Arenella s.r.l.
- Nautica F.lli Galizzi s.r.l.
- Si.Ti.Mar s.r.l.
- Salpancore s.r.l.
- Cantiere Nautico Adorno & Giacalone S.r.l.

Each of them was contacted by telephone and after obtaining a positive result regarding their collaboration, the day of the interview was scheduled. Each interview has been structured based also on information obtained through the companies' websites. In addition, it has generally been addressed to the company's manager or to the person who more than any other was able to have a complete knowledge of the company. Then the information collected were synthetized and value chain adapted model was built. The model made it possible to highlight environmentally relevant activities and processes. Thanks to this, it has been possible to apply a green perspective and to identify the sources of pollution.

5.1 Italian regulations regarding marinas

Until now, the comprehension of the word marina has been taken for granted. Universally, a marina is a small port that serves as a base for pleasure boating and provides services to shipowners. At this point it is appropriate to give a more precise definition and put it in the context of the companies studied.

The Italian legislation (D.P.R 509 of 2 December 1997 and Law no. 84 of 28 January 1994) provides guidelines for the classification of port facilities for pleasure boating. The following distinction is made:

- Tourist port (it is the literal Italian translation of what is called "marina"), "complex of removable and immovable structures built with facilities on land and at sea in order to serve only or mainly pleasure boating and yachting, also through the provision of complementary services".
- Tourist landing place, “portions of multipurpose ports [...] intended to serve pleasure boating and yachting, including the provision of complementary services”.

- Mooring points, "maritime state property areas and water bodies equipped with facilities that are not difficult to remove, intended for the mooring, launching and storage of small boats and pleasure craft".

5.2 Marinas examined

Coming back to the companies examined, the most appropriate definition is that of "tourist landing place" rather than marina. In fact, all the facilities under examination are portions of ports rather than actual ports. Despite this, taking into consideration the activities carried out by the companies and the services offered, it is clear that they are no different from those of a real marina (according to the definition given by the regulations). Therefore, for the purposes of the study it is possible to consider these facilities as marinas.

Remaining on the subject, it is possible to begin to describe more closely the reality of Palermo's marinas in order to understand what the fundamental characteristics are. according to the analysis carried out, it has been understood how essentially the work of the companies focuses on two main aspects. One aspect concerns the activities that are typical of pleasure boating. In fact, it concerns the management of moorings. The second type refers to the typical activities of the ship repairing industry, i.e. everything that has to do with the care of pleasure boats. All of this will be explained more accurately in the next paragraphs where a close look at each case study is going to be taken.

In the following, attention is focused on those core activities carried out by the company that are relevant from the point of view of environmental impact. In cases where the value chain model reports "no activities", the type of activity in question is performed by third parties or not performed at all (this is the case for technology development activities). In the course of the analysis, all the activities reported in the models in the figures were studied, but for the sake of synthesis these are not discussed in detail below. Before explaining the results of the analysis, it should be stressed that the information contained in the value chain model was obtained through interviews. Therefore, it cannot be excluded that some information may not have been transmitted by the respondent voluntarily or by forgetfulness. In addition, the interviews in their succession aimed to discover aspects that had not yet been explored, rather than focusing on known aspects unless they were considered crucial. Therefore it is possible that in some spots value chain description may appear to be poorly defined.

5.3 Marina Arenella s.r.l.

Marina Arenella s.r.l. is a dry port in the Arenella district of Palermo. The company is responsible for the management of the piers, maintenance, as well as the management of the storage of boats which, being a dry port, plays a fundamental role for the company's business. The associates of the company take care of the administration. Forklift operators, maintenance technicians and moorers are employed. On average, the total number of people involved in the work is 8 (including the administrators). This is a very modern reality, with a strong awareness of issues related to environmental sustainability. The company, according to one of its partners, operates according to the logic of a quality management system and is committed to minimizing the environmental impact of boat maintenance activities. In addition, the company's managers are committed to maintaining a high level of service for customers by managing, with the support of an information system, the high number of boat handling operations.

Value chain model

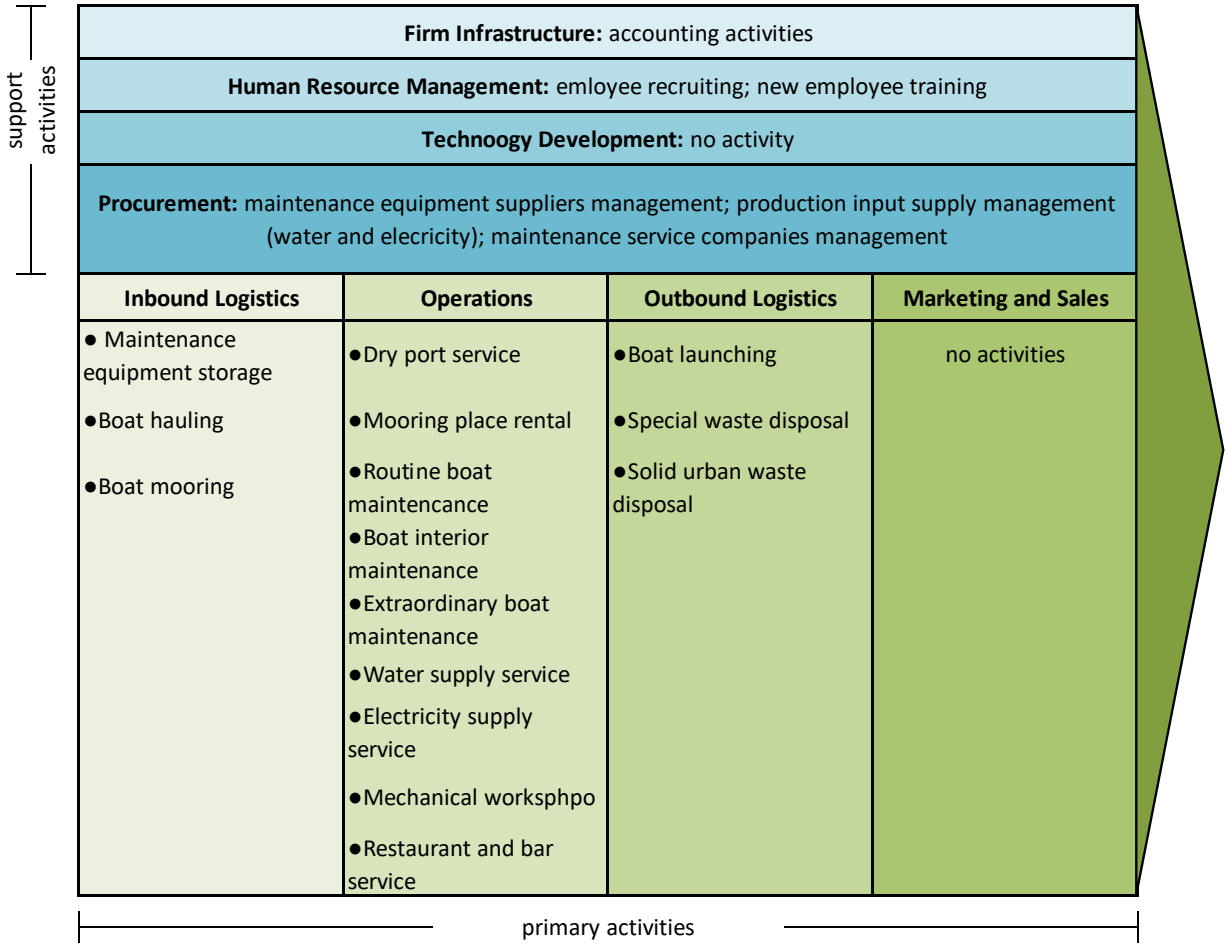

FIGURE 6 - MARINA ARENELLA S.R.L. VALUE CHAIN

5.4 Nautica F.lli Galizzi s.r.l.

Nautica Fratelli Galizzi s.r.l. is a historical family business in the port of "La Cala" of Palermo that has been active in the ship repair industry since 1860. What distinguishes this repair yard from others is the considerable experience in the maintenance of hulls, not only of the most modern fiberglass boats, but also of wooden vintage boats. The company also deals with mooring rental and therefore with the management of the piers, but this is a secondary business for them compared to maintenance, which is the core of the company's business. The number of employees is five, of which four are actively involved in core activities while the remaining member carries out secretarial work. No one has a specialization or any kind of qualification, they all "learned the job" in the field. The main driver towards environmental sustainability are regulations.

Value chain model

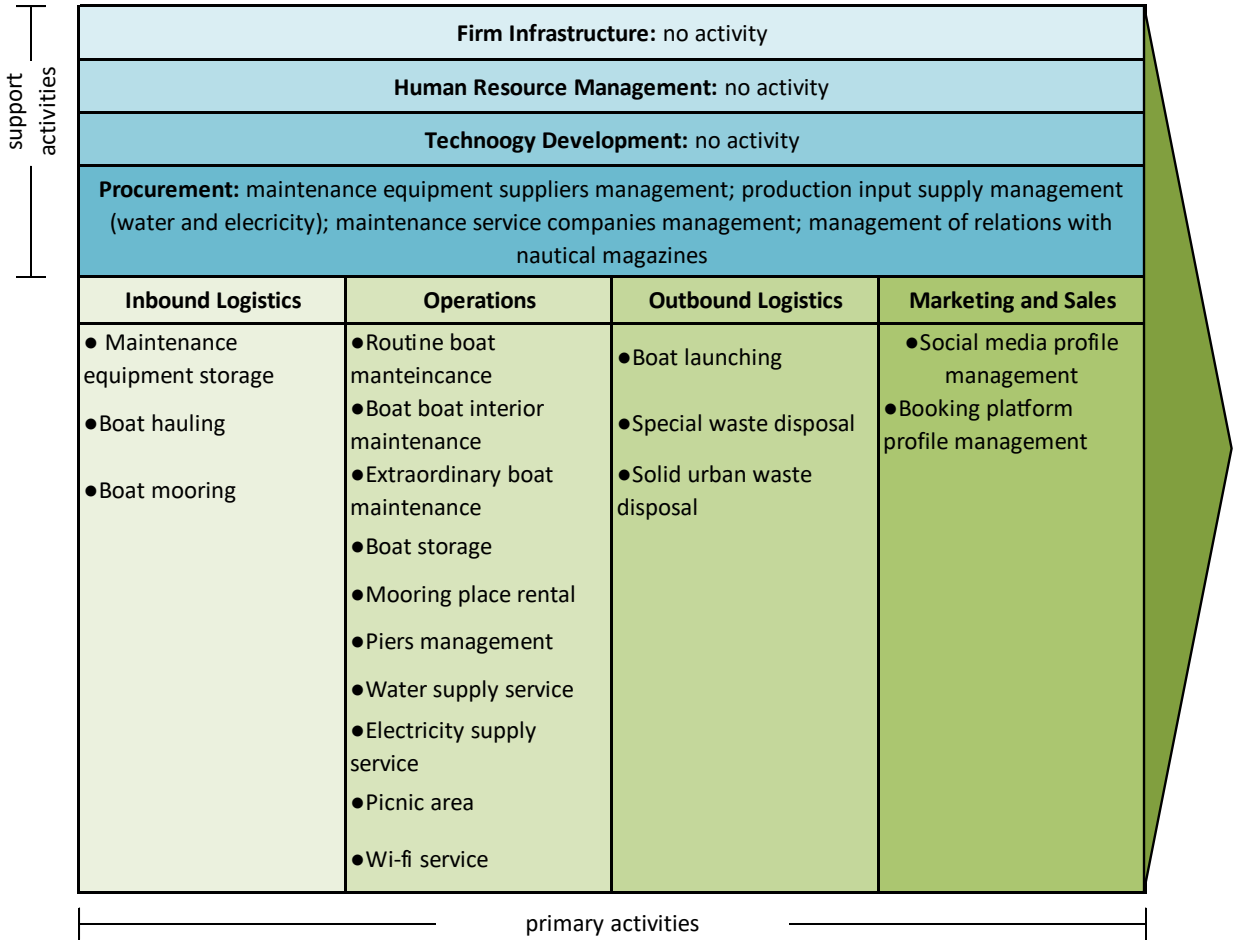

FIGURE 7 - NAUTICA F.LLI GALIZZI S.R.L. VALUE CHAIN

5.5 Si.Ti.Mar s.r.l.

Si.Ti.Mar. s.r.l. is a company located in the port of "La Cala" of Palermo which is mainly involved in the management of piers. It has a modern management characterized by a remarkable attention to the customer. Maintenance activities are also carried out, but these are very basic operations. The core activity is in fact the management of the piers and the assistance of the customer, who in addition to services related to the boat can take advantage of concierge services. The company is managed by an administrator who also acts as a concierge, but he is not the owner of the company. There are three employees, two moorers and a night watchman. Since very simple maintenance activities are carried out by the company, environmental sustainability is not a major management concern.

Value chain model

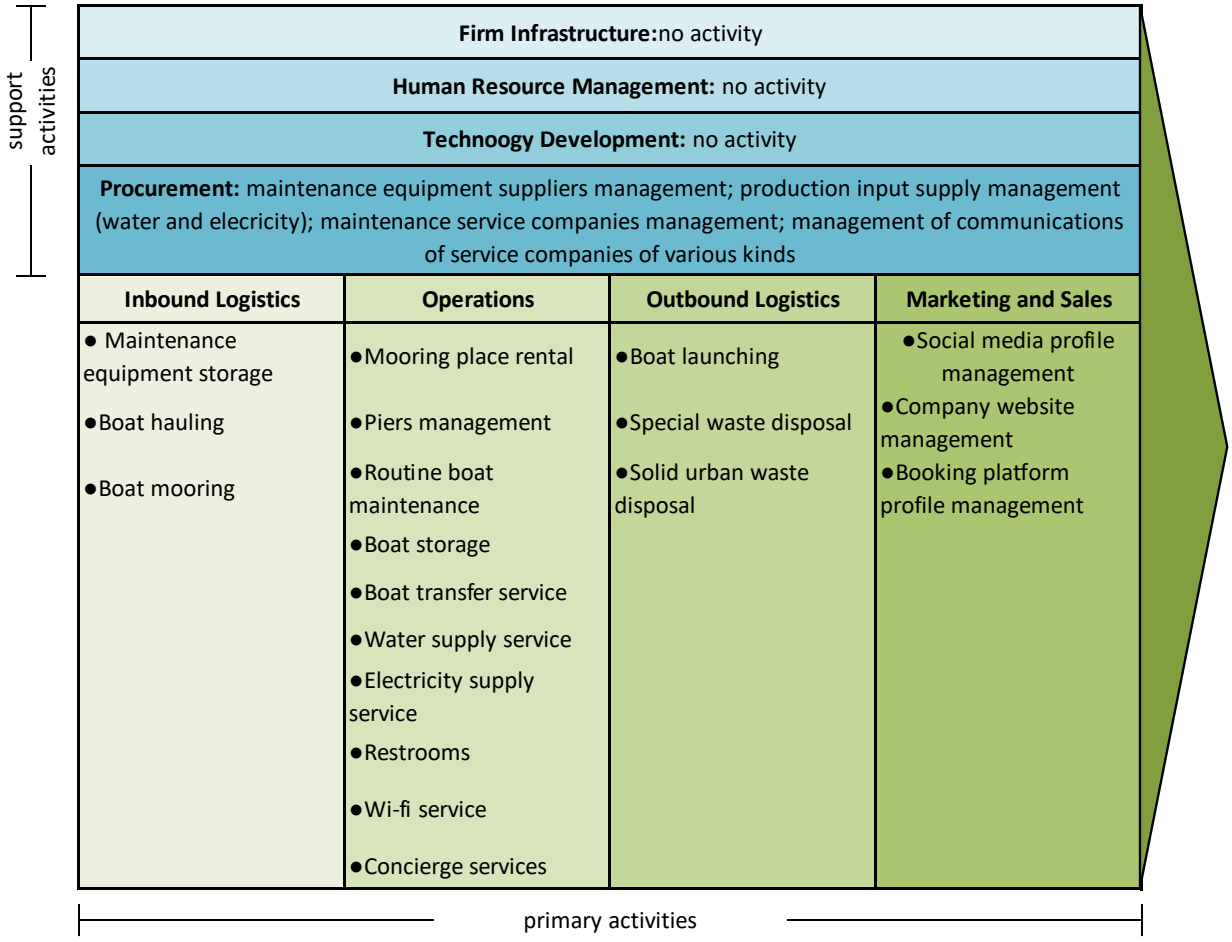

FIGURE 8 - SI.TI.MAR S.R.L. VALUE CHAIN

5.6 Salpancore s.r.l.

Salpancore s.r.l. is a company located in the port of "La Cala" of Palermo. It deals with mooring management and maintenance. The company is mainly focused on dock management and customer care. The ship repair on the other hand plays a marginal role. Three employees work there, one of whom is in charge of administration and customer care and the other two of the operational part and maintenance activities. The owner of the company is not involved in routine activities.

Value chain model

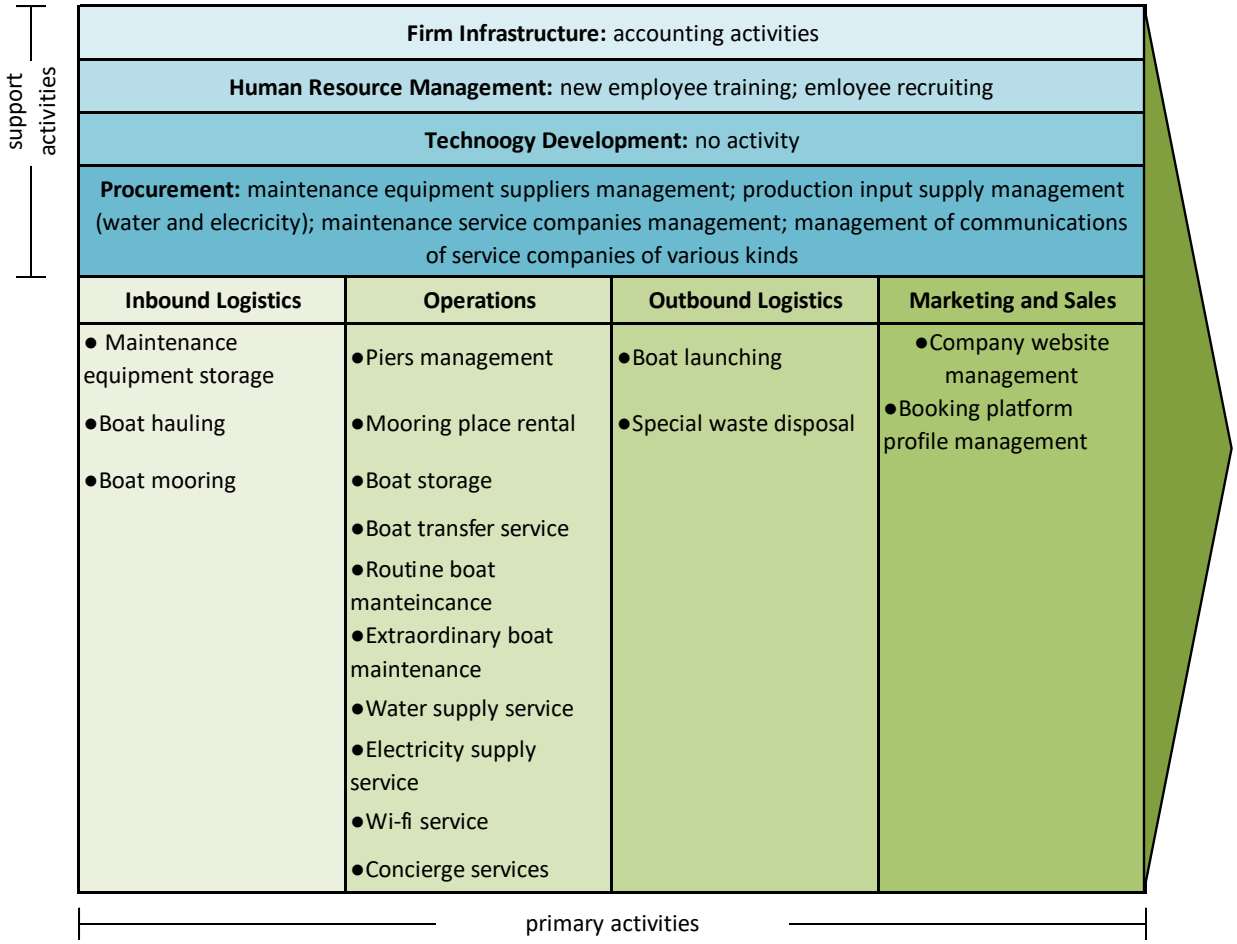

FIGURE 9 - SALPANCORE S.R.L. VALUE CHAIN

5.7 Cantiere Nautico Adorno & Giacalone s.r.l.

Cantiere Nautico Adorno & Giacalone S.r.l. is a family business located in the port "La Cala" of Palermo. The company takes care of both the maintenance of pleasure boats as well as the management of the piers. It can be said that the two types of activities are equally important although the company is mostly known as a ship repaire yard. In fact, on the one hand the company enjoys an excellent reputation as a repair yard and has highly qualified workers, on the other hand it is very attentive to the needs of customers and is committed in providing a service that goes beyond the simple activities related to the boat. In the daily activities two general workers are involved, one specialized in painting and one specialized in both painting and welding. The administration is managed by members of the family of entrepreneurs, two of whom are mainly involved in accounting and two others are involved in the management and

execution of maintenance activities. From an environmental point of view, the administrators are very careful and scrupulous in respecting the regulations.

Value chain model

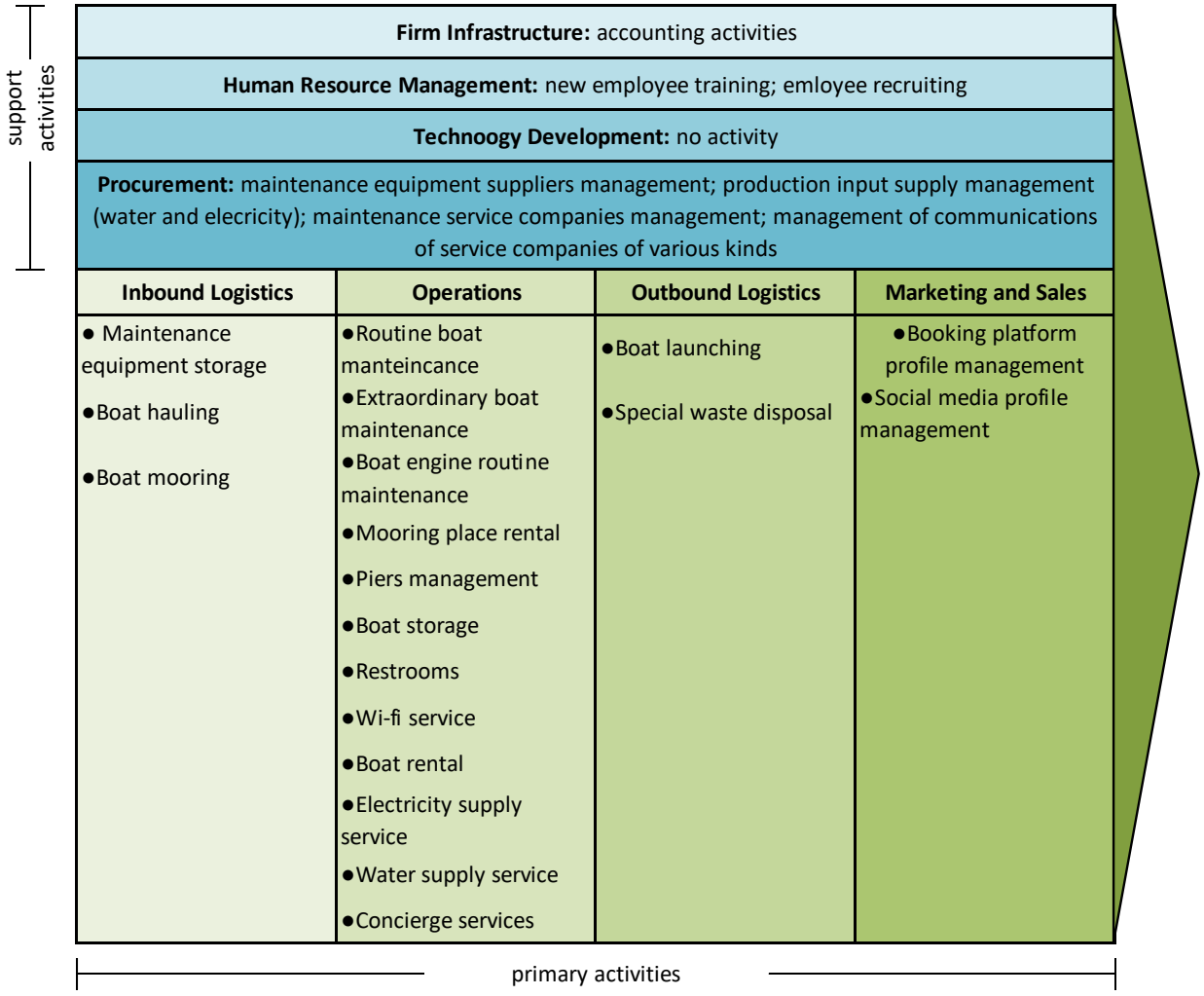

FIGURE 10 - CANTIERE NAUTICO ADORNO & GIACALONE S.R.L. VALUE CHAIN

6 ACTIVITY ANALYSIS

Value chain has allowed us to take a look at companies from above. It has also given the opportunity to understand which are the core activities and processes on which the business is based on and to highlight sources of pollution. A more in-depth analysis of the activities allows to better understand their environmental impact. The analysis of the activities is carried out in the following paragraphs. Although sources of pollution have already been identified, this analysis add new information, synthetize all information collected and propose sustainability driven reflection which better allow to comprehend the impact of already identified sources. It also focuses on and investigates what are the common aspects of the companies' activities, which are to be considered typical of the sector. These aspects, given the remarkable similarity of the companies, that can be noted by looking at the different value chains, are by no means few.

6.1 Maintenance equipment storage

This is the set of activities that are linked to the reception and storage of equipment that is essential to carry out maintenance activities. This includes, for example, materials such as gloves, paints, screws or zinc plates. Storage operations do not seem to have much impact on the environment. In fact, the goods are small in size and in volume. However, storage operations use forklifts and heavy vehicles are required to deliver the goods. In this case the use of electric forklifts and a supply management aimed at reducing CO2 emissions (e.g. less frequent orders) could reduce the environmental impact of the activity. It should be noted that almost all the material stored can be a source of pollution in case of dispersion. It is also necessary to ensure the traceability of the goods according to the regulations.

6.2 Boat mooring

The mooring process consists of the owner's reception activities and assistance during the actual mooring phase. Generally client is responsible for the execution of mooring, but it is considered good practice to assist him by giving instructions. It must be said that during the whole operation the boat's engine generally remains switched on, so the longer the time taken, the more pollution will be produced. Therefore, practices that facilitate mooring and the use of experienced personnel is certainly very advantageous. In addition to this, there are activities that could be defined as bureaucratic, such as the verification of the port of departure of the shipowner or his registration. This type of activity also reveals potential sources of pollution. If, for example, the verification operations are prolonged for a long time, the client will not be able to moor while

waiting. In addition, if the mooring has not yet been assigned or has not been vacated yet, the customer's waiting time will increase, so also CO2 emissions increase.

Another fundamental aspect related to the owner's reception is related to regulations. In fact, although it is likely to be presumed that the customer already knows the regulations and knows what can and cannot be done, it is good to inform him of his obligations. For example, Italian law prohibits shipowners from using on-board toilets when this involves unloading waste in port.

6.3 Boat hauling

It consists of lifting the boat generally before maintenance or storage activities. It is carried out using a crane or a forklift. In this case the main problem is related to emissions from lifting equipment. Therefore, the use of more ecological vehicles certainly results in less pollution. Since operations of this type can be very frequent, for example in the case of a dry port, it is recommended that the vehicle used is kept in an optimal operating condition. Conversely, emissions could be higher. Another possible source of pollution could come from the internal handling of ships that have been taken up on shore. If this does not appear to be relevant for a small shipyard, it could be highly impacting on a larger structure or dry dock.

6.4 Mooring place rental

Mooring place rental concerns the set of activities starting with the receiving of bookings from a shipowner. They concern the management of reservations, the preparation of the preventive and of the contract and the consequent assignment of the mooring place, but also the possible rearrangement of the disposition of the boats. In fact, depending on the tonnage of the boats it may be necessary to change the layout of the boats already moored (but this is more an extraordinary than a routine situation). A crucial element in this process is to ensure that the place assigned to a boat is free and ready to accommodate the incoming boat. These activities are generally carried out with the support of information systems. It can be used simple platform to manage bookings, up to more sophisticated mooring assignment systems. A good system to ensure efficient communication between employer is also crucial. All this is essential to ensure the efficiency of the process. An inefficient process could be problematic from a CO2 emissions point of view. An incoming shipowner who does not find the assigned position already vacated would have to wait with the risk of increasing emissions. As mentioned, another important aspect concerns the rearrangement of boat disposition. A poorly reasoned arrangement can have the effect of increasing the number of boat movements necessary to find a suitable configuration of the port.

6.5 Piers management

These activities are necessary to ensure that boats moored remain in a safe condition. In For this purpose, companies use video surveillance systems. This, on the one hand, prevents vandalism or theft and, on the other, is a useful tool for monitoring the condition of boats. This is not only useful for the protection of the customer's property, but also from an environmental point of view. In fact, a moored boat is to be considered a potentially polluting element. In particular, adverse weather conditions could damage the boat, causing the dispersion of pollutants such as fuel, oils or bilge content into the sea. Therefore, even if according to the law the responsibility of the boat lies with the owner, if one of the company's employees should notice that the boat has been badly moored or is in a precarious safety condition, he will intervene to improve the mooring conditions. It is therefore essential to have an excellent knowledge of mooring techniques and technical knowledge of the boats.

6.6 Boat maintenance

Activities concerning the maintenance of the boat are certainly the most relevant from the point of view of environmental impact for the type of company in question. Both for the dangerous nature of the waste produced and for the frequency with which the maintenance activities are carried out.

Speaking of maintenance, it refers to ordinary maintenance activities and in particular those carried out on the hull of the boat. Some of the companies examined also deal with extraordinary maintenance operations, which are more complex and require a more qualified workforce. Others also carry out maintenance work on the interiors and other parts of the boat (if minor problems are involved). But given the importance of routine maintenance for the companies examined, as well as the greater frequency of this type of intervention compared to others, the focus during the surveys was mainly on routine maintenance activities. In any case, the extraordinary activities are to be considered similar in terms of environmental impact to ordinary activities.

Returning to the description of the activities, ordinary maintenance concerns the control, cleaning, potential repairs and replacement of parts of various kinds (such as zinc plate or sea cocks) that must be disposed as special wastes. The main focus is on the hull of the vehicle but the entire boat is inspected. Another very common activity is a treatment necessary to eliminate and prevent damage caused by osmosis of water between the layers of fiberglass. In any case, maintenance work involves abrasion of the layers (on the entire hull or on portions) of old paint and ends with painting (which requires different types of products). These repair and cleaning

activities produce waste that has a high environmental impact. In particular, dusts and liquid wastes containing oils and other pollutants are produced. Those are collected in special tanks and subsequently disposed of. In addition, objects used during the activities such as gloves, rags or safety masks and containers of used chemical products must also be disposed of as special waste. Often the engine oil is also changed, in these cases even the exhausted oil has to be disposed as special waste. It should be stressed that in order to be able to carry out these activities in environmental safeguards it is necessary to have the appropriate equipment and facilities. Also the necessary technical knowledge about materials involved and the risks associated with them, as well as adequate training on safety at work. During maintenance, activities that require the intervention of vessel lifting vehicles are also carried out. For them the above considerations are applicable.

6.7 Boat storage

It covers the transfer of the boat to a storage and the activities related to the assignment and traceability of the assigned spaces. The designated place may be an indoor warehouse or an outdoor storage facility on a yard. For the execution of this activity lifting vehicles are required, for which the comments made above may be considered applicable. It is also important to point out that boat storage is to be considered as a very useful practice in favor of environmental sustainability. The boat in the water, as already mentioned, is itself a potentially polluting element. Therefore, hauling the boat and storing it eliminates the risk of the boat being damaged and therefore the potential dispersion of polluting material. Another advantage of keeping the boat out of the water is that no vegetation forms on the hull. This reduces the need to apply antifouling paint which is a pollutant. In this direction, the use of a dry dock rather than a classic marina is advantageous. In fact, the dry port provides for hauling every time the boat returns to port and does not have to be used again in the short term. In a traditional marina instead the storage of the boat is done mainly during the winter season. Of course it should be noted that the dry dock needs more space for storage of boats and leads to an increase in the number of hauling and launching operations.

6.8 Boat launching

It consists in the positioning of the boat in the assigned mooring place and in the preparation of the boat so that it can be used by the shipowner. This is essentially the reverse process to boat hauling. It also requires the use of a lifting vehicle. From an environmental point of view, the previous considerations regarding the use of a lifting vehicle still apply. It is also worth

mentioning that handling operations should be managed in the most efficient way and carried out with a focus on minimizing CO2 emissions.

6.9 Waste disposal

Waste disposal may concern both solid urban waste and special waste of various kinds. As far as solid urban waste is concerned, this is no difference at all from domestic waste. Those are produced either by the cleaning of the marina areas (clearly not the maintenance areas) or by customers, who collect them while they are in the boats and once landed they have to dispose. This waste is simply placed in the containers used for collection and then collected by the Palermo's port authority that manages the service (or by the municipality of Palermo in the case of Marina Arenella s.r.l.).

The disposal of special waste instead is a process that presents a high degree of complexity, as each type of waste has its own disposal channel. This process concerns those activities related to tracking, storage in the dedicated container and disposal of special waste. In fact, since the kind of wastes has a very significant environmental impact, there are very precise regulations regarding disposal and each type of waste presents specific problems. In any case it is necessary to store the wastes in containers which are appropriate for each type of substance and it is necessary to ensure traceability until the waste is delivered to the appropriate disposal company. Waste from maintenance activities has already been discussed. In addition to this waste, there is also water that has accumulated in the bilge if pollutants have been accumulated. Another special waste is the content of the black water tank that customers may need to empty. In order to carry out these activities in an environmentally friendly way, both the operator and the employees of the company need to have a good knowledge of the regulations.

6.10 Restroom

Finally, it should be remembered that the management of installations on land can also have an environmental impact. Customers getting off the boats may need to use toilets and showers, especially considering the fact that shipowners cannot use the on-board toilets if the boat's black water tank is full. For this reason, it is necessary for companies to provide dedicated spaces for such services. In these cases the waste produced does not differ from normal household waste.

6.11 Analysis closure

In the previous paragraphs the core activities of marina management have been described. These are complex activities which could have considerable environmental impact. The activities

were analyzed with an emphasis on environmental sustainability. The sources of pollution have therefore been highlighted and it has been seen that these are essentially three types:

- Maintenance waste;
- Direct CO2 emissions;
- Potential dispersion of pollutants in water.

7 CONCLUSIONS

To recap an analysis of the scientific literature was carried out to acquire knowledge about approaches that have been applied in the analysis of environmental impact of processes. After this review a model inspired by Porter's value chain was proposed. The implementation of the activity mapping approach to case studies highlighted which are the critical issue from the point of view of sustainability. More importantly, it has revealed the main sources of pollution linked to the core activities of the sector. Those are essentially three types, maintenance waste, direct CO2 emissions and potential dispersion of pollutants in water. The contents presented are a reasoned and systematic synthesis of the information emerged during the interviews. It is inevitable to think that a qualitative approach of this kind does not guarantee that some useful information has been left out, due to forgetfulness of the interviewee or inattention of the interviewer. However, it has been thought that the methodical approach has made it possible to obtain valuable content for a comprehensive understanding of the industry and the main issues related to the sustainability of marina management. Despite any criticism the work carried out has made it possible to gain awareness about critical issues from an environmental point of view in the marina industry, which was indeed the purpose of these work. This study was initiated without any previous knowledge about marina industry and an approach that was both goal directed and exploratory was applied. Of course, a more detailed approach able to look closely at individual processes, or a statistical approach able to obtain information which are statistically significant, could "bring to light" new details, as well as assessing the extent of what have been highlighted herein.

The analysis of the training offer was completed and the groundwork for analysis of the competence need have been laid. The extent of this work reaches this point. But the information collected makes it possible to proceed to the next step in order to achieve the goal set by *Incamp* project. It is necessary to identify and apply a methodology to extract competencies on the basis of the results obtained from the application of the mapping approach. Finally, it would be necessary to compare them with the current training offer and proceed to identify the discipline of a master's course in sustainable management of marinas. The creation of a managerial figure specialized in sustainable management of marinas would make it possible to bring together in one person all the specific skills required. The implications of such an outcome are not easily predictable. Surely, however, in line with the philosophy of the project, it can be thought that this would ensure that compliance with sustainability regulations is not only seen as a burden. On the contrary, it can be expected that compliance would be pursued with awareness, but above all integrated in the context of an efficient management of marinas.

8 REFERENCES

Brown, A., Amundson, J., Badurdeen, F., 2014. Sustainable value stream mapping (Sus-VSM) in different manufacturing system configurations: application case studies. Journal of Cleaner Production 85, 164-179.

Caldera, H.T.S.; Desha, C.; Dawes, L. Exploring the role of lean thinking in sustainable business practice, Global Cleaner Production Conference, 2015.

Caldera, H.T.S.; Desha, C.; Dawes, L. Exploring the role of lean thinking in sustainable business practice: A systematic literature review. J. Clean. Prod. 2017, 167, 1546–1565.

Decreto del presidente della repubblica 2 Dicembre 1997, n. 509.

Faulkner, W., Badurdeen, F., 2014. Sustainable Value Stream Mapping (Sus-VSM): methodology to visualize and assess manufacturing sustainability performance. Journal of Cleaner Production 85, 8-18.

Gohar, S. R., & Indulska, M. (2015). Business process management: saving the planet?. In Australasian Conference on Information Systems (ACIS).

Houy C, Reiter M, Fettke P, Loos P (2011) Towards Green BPM—sustainability and resource efficiency through business process management. In: Business process management workshops, Springer, Berlin, p 501–510.

R. Hung, "Business process management as competitive advantage: A review and empirical study", Total Qual. Manage. Bus. Excellence, vol. 17, no. 1, pp. 21-40, 2006.

King, A.A., Lenox, M.J., 2001. Lean and green? An empirical examination of the relationship between lean production and environmental performance. Production and Operations Management 10, 244-256.

Kurdve, M., Shahbazi, S., Wendin, M., Bengtsson, C., & Wiktorsson, M. (2015). Waste flow mapping to improve sustainability of waste management: a case study approach. Journal of Cleaner Production, 98, 304-315.

Legge 28 Gennaio 1994, n. 84.

Maciel, J. C. 2017. “The Core Capabilities of Green Business Process Management–A Literature Review,” in Proceedings of the Wirtschaftsinformatik (WI), St. Gallen, pp. 1526–1537.

Marimin, Darmawan, M. A., Machfud, Islam Fajar Putra, M. P., & Wiguna, B. (2014). Value chain analysis for green productivity improvement in the natural rubber supply chain: a case study. Journal of Cleaner Production, 85, 201-211.

Nowak, A., Leymann, Schumm, D. (2011) The Differences and Commonalities between Green and Conventional Business Process Management, Dependable, Autonomic and Secure Computing (DASC), 2011 IEEE Ninth International Conference.

Nowak, A., Leymann, Schumm, D. (2011) The Differences and Commonalities between Green and Conventional Business Process Management, Dependable, Autonomic and Secure Computing (DASC), 2011 IEEE Ninth International Conference.

Opitz, N., Krüp, H., Kolbe L. M. (2014): Green Business Process Management – A Definition and Research Framework, Hawaii International Conference on System Sciences.

Opitz, N., Krüp, H., Kolbe L. M., "Environmentally sustainable business process management - developing a green BPM readiness model." PACIS, 2014.

Porter, M. E.: Competitive Advantage. Free Press, New York, 1985.

Recker, J., Rosemann, M., Hjalmarsson, A., Lind, Mikael. (2012) Modelling and Analyzing the Carbon Footprint of Business Processes, in: vom Brocke, J., Recker, J., Green Business Process Management - Torwards the Sustainable Enterprise, Springer, Heidelberg, Germany.

Scheer, A.-W.: Business Process Engineering - Reference Models for Industrial Companies. Springer, Berlin (1994)

World Commission on Environment and Development (WCED) (1987) Our Common Future, Oxford University Press, UK and New York.

RT White, G., & James, P. (2014). Extension of process mapping to identify “green waste”. Benchmarking: An International Journal, 21(5), 835-850.

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