

# MaDox: A Digital Tracking and Scheduling System for the Dry Docking of Philippine-flagged Vessels

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## ABSTRACT

The Philippine maritime industry is leaping towards advancements through technology solutions. To support this movement, the MARINA Strategic Voyage Plan 2028, under Program 5, aims for the development of a Global Maritime Hub in the Philippines. This program entails spearheading research projects focusing on the innovation of maritime ancillary services that would involve Philippine-flagged vessels, ship owners, local shipyards, and the Maritime Industry Authority (MARINA).

Drydocking is one of the salient processes in the country's maritime industry. During this process, a vessel is brought to dry land to perform necessary maintenance and repair. As per the International Convention for the Safety of Life at Sea (SOLAS) requirements, all merchant vessels need a complete survey of the hull twice within a 5-year period and an intermediate survey within 36 months from the previous drydock. To adhere with these international SOLAS requirements, Philippine-registered ships need to be drydocked twice every five (5) years.

The absence of a digital tracking and scheduling system causes the ship owners to have difficulties in overseeing their vessel's drydocking calendar as required by SOLAS. Since shipyards have a limited drydocking capacity, urgent drydocking appointments may pose scheduling problems on the side of the ship owners as to which shipyard would be readily available to provide immediate drydocking service. Likewise, shipyards would need to create changes to their working schedules to accommodate these urgent drydocking appointments. These rush appointments also tend to have lacking vessel plans and documents needed to start the drydock as scheduled which results in further delays.

With this problem in mind, the authors propose to design and develop a digital tracking and scheduling system for the drydocking of Philippine-flagged vessels. The provision of such a system would optimize the ship drydocking process and would further lead to more efficient operations in boatyards, shipyards, and in the maritime industry in general.

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## 1. INTRODUCTION

During a ship's life, there will be times when essential maintenance is required which cannot be handled by employment of the crew during its normal trading pattern. These areas are often concerned with the submerged volume area of the vessel and must, as a matter of safety and routine, be addressed at some stage inside the perimeter of a dry dock. [House, D. (2015)] Such a process is called dry docking. Dry-docking works are categorized into two types - 1) routine maintenance and 2) occasional maintenance. Regular maintenance includes tasks like hull coating, various clearance measurements, overhauling sea valves, calibrating anchor chains, and cleaning chain lockers that are completed on a regular basis and in accordance with Classification Society rules. The term "occasional maintenance" refers to tasks like propeller removal, tail shaft withdrawal, tunnel thruster(s), and other tasks that are mandated by Classification Society regulations or suggested by the surveyor that both adhere to international rules and regulations.

As per the International Convention for the Safety of Life at Sea (SOLAS) requirements, all merchant vessels need a complete survey of the hull twice within a 5-year period and an intermediate survey within 36 months from the previous drydock.

In adherence to the aforementioned requirement, the Philippine Maritime Industry Authority (MARINA) has issued MARINA Memorandum Circular 203 s. 2005 and 03

s. 2021 which generally enumerates the rules and regulations to be followed by all of the concerned entities during the drydocking process.

MC No. 203 s. 2005 states that all Philippine-registered ships regardless of hull construction operating in the Philippine waters, including but not limited to fishing vessels, shall be required to secure the applicable ship safety-related certificates as provided in the Ship Safety Inspection System (SSIS). Likewise, vessels shall then be required to undergo dry-docking twice within the five (5) years dry-docking cycle as required under MC. No. 03 s. 2021, and its subsequent amendments.

With these rules and regulations in sight, it is apparent that the drydocking of a vessel is a necessary action to take by all domestic ship-owners which is evident as domestic ship repair accounts for around 90% of domestic shipyard revenue. Having over thirty-six thousand (36,000), Philippine registered vessels as per MARINA registry dated December 2017 and only seventeen (17) large or medium - sized domestic shipyards, along with about ninety (90) smaller yards in approximation [DTI Policy Briefs Series No. 2017-08], proper scheduling of the drydocking period of their vessels will be essential in ensuring that the vessels will be drydocked in accordance with the rules and regulations. Ship owners should also consider to avoid the peak season wherein the vessels need to be in service. Determining the most appropriate time to schedule the dry docking, it is important to bear in mind

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that we would not want to miss a particularly attractive period in the spot chartering market because the ship is in dry dock.

Since shipyards have a limited drydocking capacity and the high number of Philippine registered vessels, ship owners will have scheduling challenges in order to minimize loss in operating time and in finding the most suitable shipyard to meet the drydocking needs of their vessel. Failure to create a proper drydocking schedule will result in urgent drydocking appointments. Urgent drydocking bookings potentially cause scheduling issues for ship owners in terms of readily available shipyards to offer immediate drydocking service. To accommodate these urgent drydocking appointments, shipyards would also need to adjust their work schedules. These rush appointments often lack the ship drawings and paperwork required to begin the drydock on time, which causes additional delays.

The authors believe that there is a need to design and develop a digital tracking and scheduling system for the drydocking of ships flying the Philippine flag in order to address this issue.

## 2. NEW PERSPECTIVE

One off-the-shelf digital dry docking system widely used in the maritime industry is smartPAL Dry Dock by MARI APPS. smartPAL is a comprehensive software that helps standardize dry docking planning by providing instructional modules and cloud services to track processes and scheduling. This system is an internal program purchased and owned only by yard owners who wish to find their current dry docking operation and schedule on one convenient program. Another similar system utilized by the maritime industry is IDWAL Dry dock. IDWAL Dry dock established a network of Marine Surveyors, Engineers, and Master Mariners. This system was mainly used in scheduling surveys and inspections by offering an assembly of highly qualified and experienced dry docking engineers for consultation and supervision.

During the peak of the pandemic, when face-to-face drydocking inspection was not possible, smartPAL and IDWAL offered an online consultation option to provide their clients with their drydocking needs.

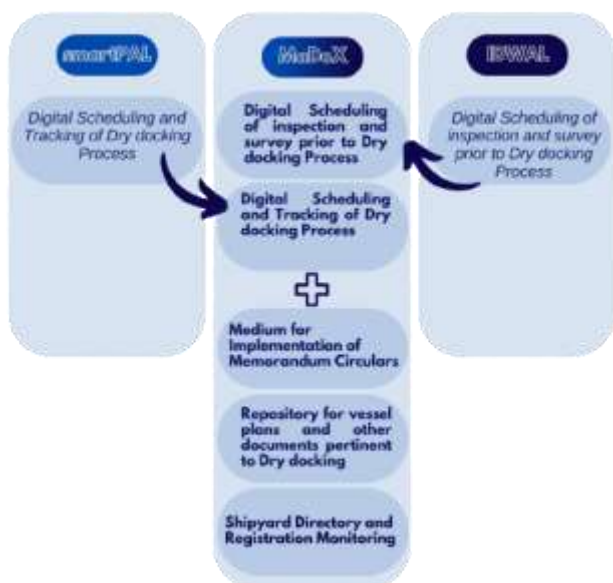


Figure 1: The proposed Maritime Drydocking and Scheduling System (MaDox)

The proposed Maritime Drydocking and Scheduling System (MaDox) involves scheduling of a vessel's Dry dock together with the compilation of all the vessel plans necessary. One of the great features of MaDox is that it is not limited to a privatized use of a program in a single company but streamlines the application and booking of ships to be dry docked. It involves all parties in the dry docking process - the Philippine's maritime regulating body - Maritime Industry Authority (MARINA), Shipowners, and shipyards all over the country.

MARINA can utilize MaDox as a database for the dry docking status of all registered vessels, which would result in more efficient regulation and execution of all Memorandum Circulars relating to dry docking. Shipyard owners could benefit from the provision of this system as well. They could register their shipyards by providing information - their type of registration as a shipyard, their facilities and equipment, and their services. This information will be visible in the interface, together with the shipyard's contact details and availability of drydocking area. Through this, the maritime industry will be able to come full circle in the implementation services and regulations in the drydocking procedures in the country.

Moreover, it is high time for the maritime industry to switch to a digital system to address the current issues and to make its system more convenient for all parties by providing real-time updates through MaDox.

## 3. GENERAL FRAMEWORK

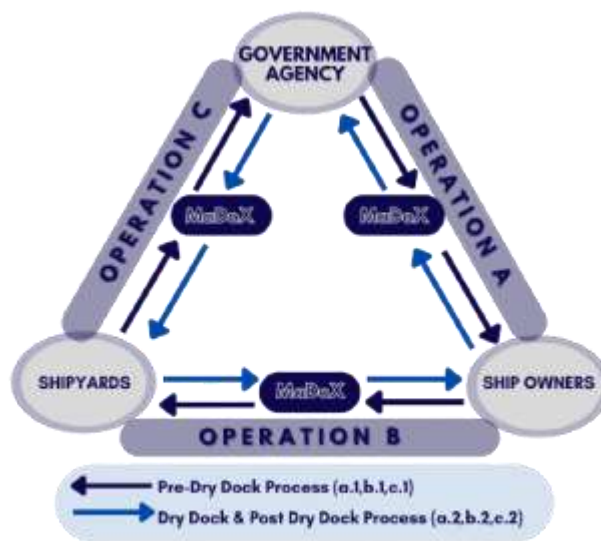


Figure 2: The General Framework

The authors considered three (3) major operations of the proposed Maritime Drydocking and Scheduling System (MaDox): (A) Government Agency to Ship Owners and vice versa, (B) Ship Owners to Shipyards and vice versa, and (C) Shipyards to Government Agency and vice versa.

### 3.1. Pre-Dry Dock Process

STEP 1 - OPERATION A (Government agency to Ship Owners)

a.1.1 Recertification and Certificate Status



The Government Agency will notify the Ship Owners about the status of their Vessel Certification through MaDox. Along with this notification is the list of necessary documents required for recertification (based on MARINA Memorandum Circular 152 s. 1999 and MARINA Memorandum Circular 203 s. 2005).

## **STEP 2 - OPERATION B** (Ship Owners to Shipyards)

### *b.1.1 Submission of Initial Scope of Works*

Upon knowing the Vessel's Certification status, Ship Owners may opt to upload an Initial Scope of Works for the vessel's drydock. This Initial Scope of Work will give potential shipyards an idea of what facilities and equipment are necessary.

## **STEP 3 - OPERATION C** (Shipyards to Government Agency and vice versa)

### *c.1.1 Shipyard Bidding*

Having the Initial Scope of Works posted in MaDox, interested shipyards may bid by providing the list of services their shipyard can offer that would match the vessel's needs. The yard may also provide the Ship Owners with the initial quotation for budget allocation.

## **STEP 4 – OPERATION A** (Government agency to Ship Owners)

### *a.1.2 Shipyard Matching and Selection*

At this point, the Government Agency, through MaDox, will provide a list of viable shipyards to the Ship Owners. Ship Owners will match and check what shipyard offers services necessary for their vessel's dry dock. They will then book the selected Shipyard for confirmation.

## **STEP 5 - OPERATION B** (Ship Owners to Shipyards)

### *b.1.2 Request for Pre-Dry docking Survey*

Upon completion of booking, Ship Owners may request the chosen Shipyard for a Pre-Dry dock Survey. This process is done to counter-check the listed Initial Scope of Works. The preliminary survey will become the basis for the Final Scope of Work.

## **STEP 6 - OPERATION C** (Shipyards to Government Agency)

### *c.1.2 Submission of Final Scope of Works*

After the Pre-Dry dock survey, the chosen Shipyard will submit the Final Scope of Work and request for the release of an Authority to Proceed. The Shipyard may also book schedules and make requests for necessary Periodic Surveys.

## **3.2. DRY DOCK & POST DRY DOCK PROCESS**

### **STEP 1 - OPERATION C** (Government Agency to Shipyards)

#### *c.2.1 Provision of Certifications, Permits, and Authority*

Next to the submission of the Final Scope of Work is the Shipyard verification. The Government Agency will scrutinize the Shipyard's registration and track record. Unless proven liable for any misconduct and grievance, the Government Agency will issue the Authority for the Shipyard to proceed with the dry docking works. The Government Agency may also provide the Shipyard with a schedule for Periodical Surveys. These surveys are essential to ensure the quality of work in the dry-docking process.

### **STEP 2 - OPERATION B** (Shipyards to Ship Owners)

#### *b.2 Execution of the Final Scope of Works*

At this point, the Shipyard will perform all the procedures necessary in the listed Final Scope of Work. This process includes the updating and completion of Vessel Plans. After the completion of all the processes, the Shipyard will issue a Dry Docking Certificate together with the complete Dry Docking Report to the Ship Owner.

### **STEP 3 - OPERATION A** (Ship Owners to Government Agency)

#### *a.2 Submission of Vessel Plans and Requirements for Recertification*

The Ship Owner will then submit to the Government Agency for review of all the updated Vessel Plans, the Dry Docking Certificate, and the Drydocking Report. A new certificate for the Ship Owner's vessel will be granted by the Government Agency once the submitted documents are determined to be in compliance.

## **4. CONCLUSION**

Considering the implications of the improvement of the quality of life for ship and shipyard owners, the researchers propose to integrate the digital aspects of technology with an innovative drydocking scheduling system. This digital system's purpose is to provide a database and determine which shipyards are readily available for drydocking, inform the ship owners the services offered by the shipyards, and contain documents and information pertaining to the vessel to be drydocked for the shipyard to use as reference for the drydocking operation.

The availability of such a technology will expedite the ship drydocking procedure and further increase operational efficiency in boatyards, shipyards, and the maritime sector as a whole.

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