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A Decision Making Approach for Operational Voyage Performance Analysis

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ABSTRACT

Nowadays economic operation of ships become more important for ship owners, ship managers due to escalating oil prices, global economic situation and environmental awareness, therefore vessel operation times and bunker expenses should be analysed to reduce time loss and expenses due to operation and bunker. These operational and bunker data should transfer from vessels, keep safely in a database and has to be ready when an analysis needed. Then according to analyse results an appropriate vessel operation strategy and a proper bunker management can be found.

In this paper, an application developed as a decision support for vessel performance analysis especially for operational and bunker performance. According to analyse results with application's decision making support, reduced vessel operational times, operation cost and running cost resulted. With improvement of this application and run more analyse for vessel voyage performance will effect positive to costs and time loss, environmental awareness.

1. Introduction

Decision making is a cognitive process which is a direction of action between several alternative scenarios that resulting in the selection of a direction (Mclean et all., 2008). Every decision making process produces a final choice (Reason, 1997). The output can be an action or an opinion of choice.

Considering the improvements in ship design and building, still vessel operational costs are not stable as expected. One important issue is global economic situation, especially uncertain oil prices, current prices wave between $ 735.00 and $ 740.00 per metric ton (pmt) (http://www.bunkerworld.com/prices/) depends on port locations. This situation affects vessels' daily expenses for ship owners and charter rates for charterer. At this point affective ship operation becomes more important matter for ship owners, ship managers moreover monitoring vessel under charter is important issue for charterer side. Charterer would like to find appropriate vessel with reasonable price for his cargo. Mostly charterer's broker offer the vessel then both sides agrees on terms with a contract. This contract called charter party, which is an agreement between the ship owner and the charter for the use of the vessel. The charterer takes over the vessel for either a certain amount of time this called Time Charter Party or for a certain point-to-point voyage called Voyage Charter (Charter Party, Wikimedia Foundation Inc., 2012). In a time charter, the vessel is hired for a stated time in the time charter party agreement. The owner still manages the vessel but the employment of the vessel, voyages and sub-chartering the vessel decision given by the charterer. Vessel performance compare to time charter party is remarkable analysis if charterer hires the vessel or a fleet periodically because owner assures vessel's speed, fuel consumption and other operational activities in the charter party therefore performance measurement of the vessel to compare with charter party agreement would be remarkable benefit for the charterer.

In this paper, voyage performance analysis studied from a charterer side as operational and bunker cost. An application developed using Microsoft Visual Studio 2008 C# programming language (Visual C#, 2012) as a decision support for vessel performance analysis for operational and bunker performance. According to analyse results, reduced vessel operational times, operation cost and running cost resulted. This paper organized in 5 sections. Section 2 pres-

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ents methodology used for work flow, database structure, inputs and outputs. Section 3 gives an introduction of application interface and its sections, Section 4 shows analyse results and conclusion presented in Section 5.

2. Methodology

The main application has two modules one for vessel side and the other is for office side use, Microsoft's database technology entity framework (Entity Framework, 2012) used to generate a database model. Application's database structure presents in figure 1 and work flow of the application both for vessel and office side shown in figure 2. firstly, vessel should input all data, these data stored in a database then it is exported as an excel document to use for official "stamped document" and analyse input file for application at office side. When this file arrived into charterer office it imported into application as a voyage data set of the vessel, then the application compares input data with charter party agreement data and gives results and reports as an output so the responsible person at the office can easily check this analyse results and make a decision about the vessel performance and can negotiate further terms with the owner or take action for possible voyage plans and make decision on operational strategy.

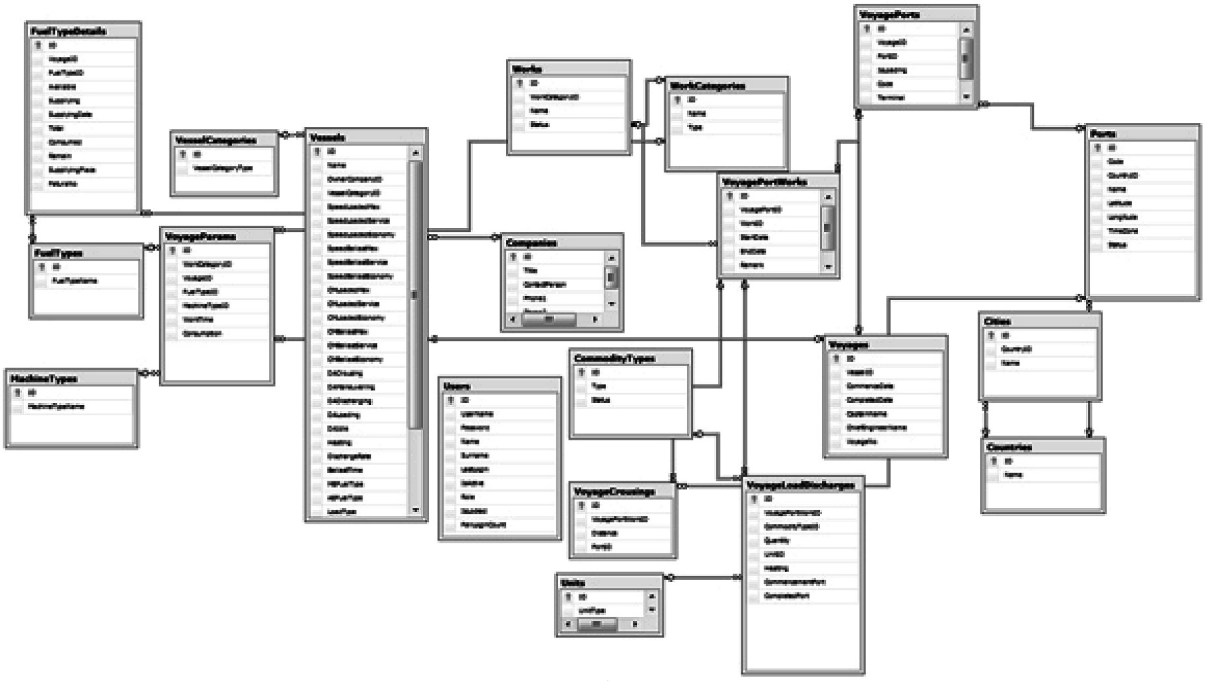

Figure 1. Database Structur.

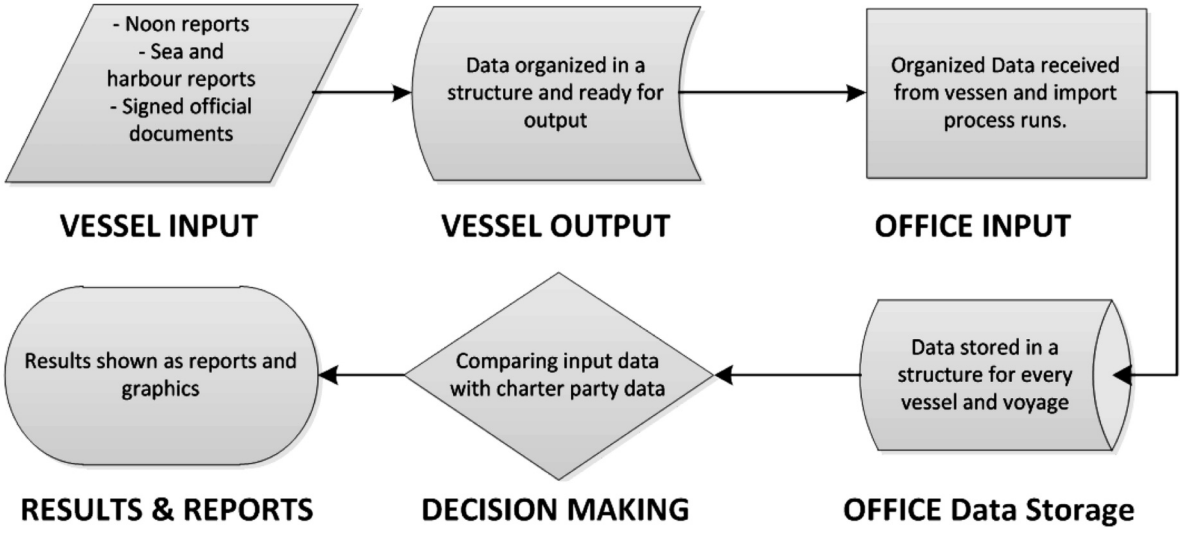

Figure 2. Application Work Flow.

3. Computer based application

In this section screens of application sections presented. In figure 3 it is shown main page of vessel side application. Vessel name, voyage number is defined at menu bar left top side also an export to excel button exist to convert input data to excel sheet. Ports list for the voyage listed under the menu bar, the ports which vessel load and discharge will be input here. Work codes tab keep the list of works during voyage and port operations. Captain enters voyage summary table which is below the work codes tab, then Voyage Result shown on the right side of work codes tab. After this step its saved and go to the next step to bunkering page.

Bunkering page has Bunker Consumption tab presented in figure 4 here chief engineer enter the consumptions for main engine, auxiliary engine and boiler then it is saved and stored in the application database, now it is ready to export and deliver the data to office for analyse.

At the office side application has more tools such as creating ports, port operations as work codes, entering charter party details. In figure 5 it shows main page of the application at office side. In office application it has vessel list menu to reach whole fleet data. When the exported file from vessel arrived to the office it can be imported to application and it will automatically put the data exactly into vessel's voyage with reference number in this screen charterer have 2 different fleet one is called black and other one is white fleet. It can be seen the vessel Ana's 12/10 voyage data inputted and listed in the voyage summary tab. User in the office can check easily entered data from this screen and see if any problems occurred during transfer or mistaken input of data.

Then user can pass to next tab, bunker supply consumption tab shown in figure 6 in this tab, user see the details of bunker consumption inputs by vessel.

After that user pass to the next tab charter party details tab. This is one of important part, in here user enter the terms of agreement with the ship owner according to charter party time agreement. This data will be stored in the application and will be used to compare the information given by the vessel. In this part vessel's speed, main engine and auxiliary engine

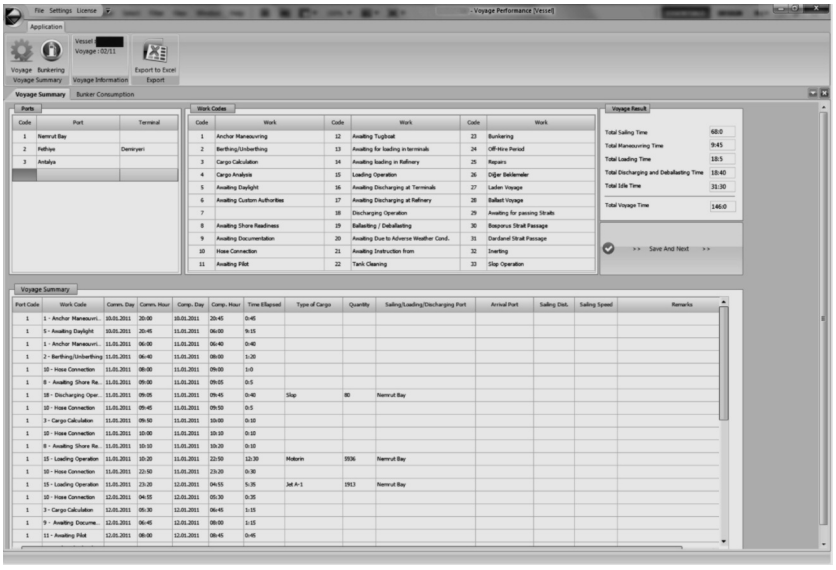

Figure 3. Vessel Voyage Input Tab.

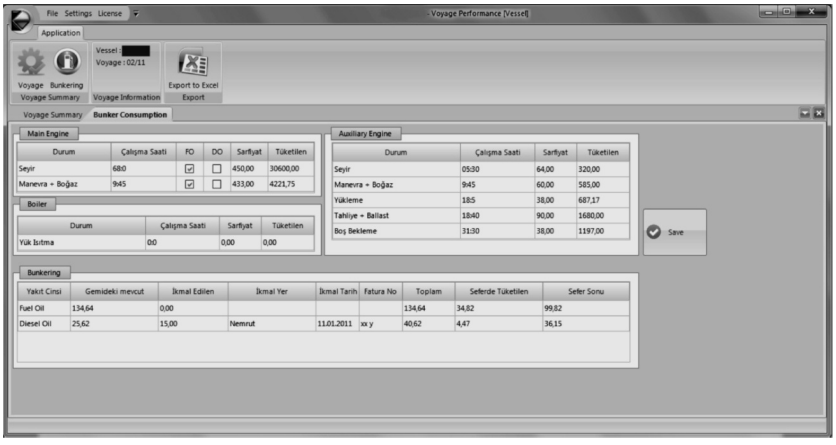

Figure 4. Vessel Bunker Input Tab.

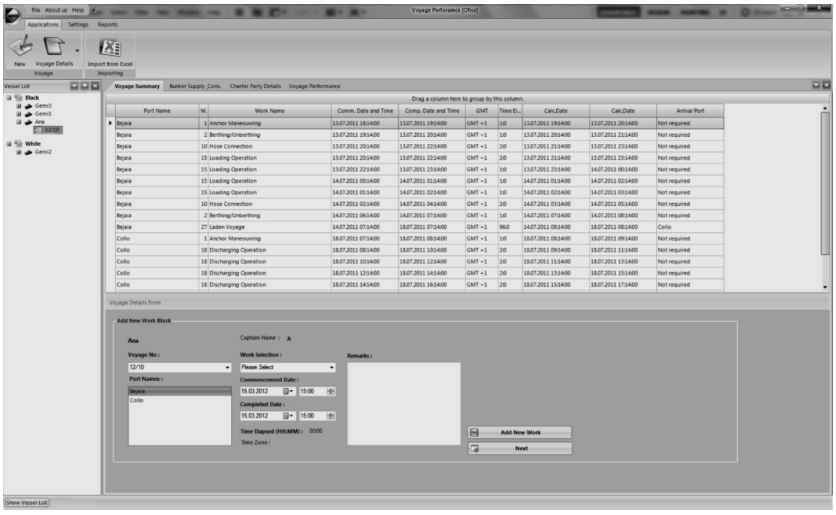

Figure 5. Office Voyage Check Tab.

consumptions, other technical information for vessel entered (Moreira, Guedes Soares, 2011). There is also a guidance inserted into the right side of the page. Office user will enter this data for one time and save it to use for all calculations for the vessel performance.

After checking that information at last, user goes to the next and final tab voyage performance tab as shown in figure 8 all the entered information will be stored and analysed with the application decision making approach and presented in this tab for user to see the results of the voyage and get final reports. In this tab every operation group called work groups have their own tabs and graphics.

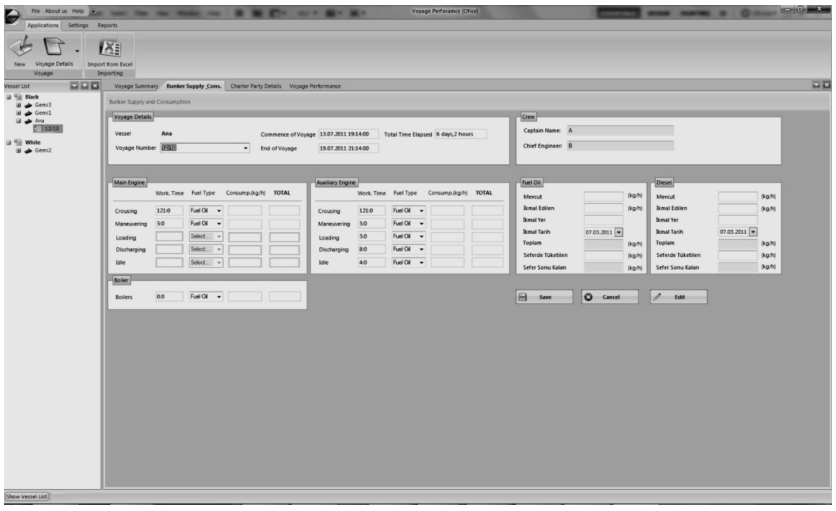

Figure 6. Office Bunker Check Tab.

4. Analyse results

Application tested with past 10 voyage records of a 6900 DWT chemical/oil tanker in 2010. Analyse results and charts helped to see exceed operation times, gaps between port operations and their reasons, outrun bunker usage according to terms in charter party agreement. From this point charterer can use these results as analyse report as a decision making support.

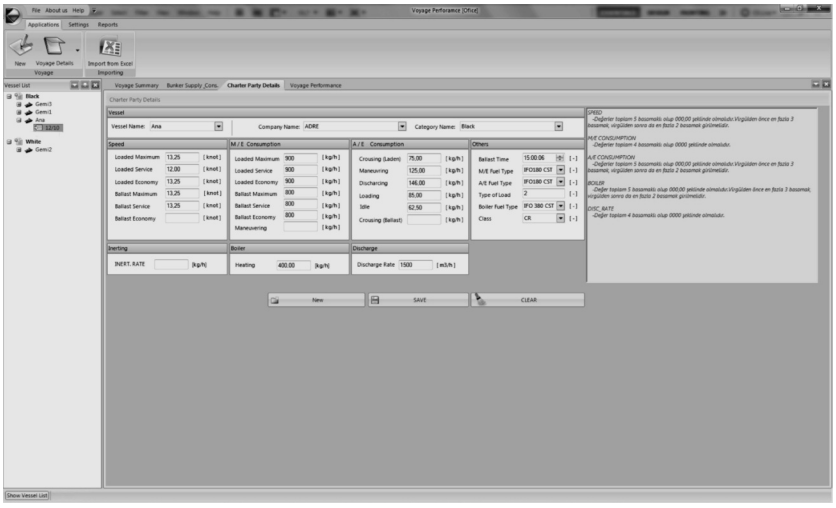

Figure 7. Office Charter Party Input Tab.

5. Conclusion

The analyse results presented as a voyage performance report to the charterer of the vessel as a support document and discussed. Suggestions from charterer will be considered for further studies.

The next step in this researched would be analyse various types of vessel's voyages and improve analyse techniques. With improvement of this analyse methods and run more analyse from different range of vessels will improve application's analyse capability which will affect positive to reduce operation costs, exceed bunker usage, time loss, operational loss and negotiate terms by owner. It is planning to prepare further study and make application available to use online and test analyse results on *www.voyageperformance.com* in next year. This research contributes to the knowledge base in voyage performance measurement from charterer view by proposing a decision making approach with a software application.

Figure 8. Office Voyage Performance Result Tab.

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