Vung Tau Fishery Improvement project

Fish meal chain data collection and visualization

Mission report July 26-August 1 2023

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Prepared for Kim Delta

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Background

Fisheries in Vietnam face problems of over-exploitation of fishery resources, too many fishing boats and too many young fish being caught. The direct consequences of these problems are significant depletion of marine resources and violations related to illegal, unreported, unmanaged (IUU) fishing. The European Commission (EC) issued the IUU yellow card to Vietnam in October 2017.

The EC's initial recommendations state that Vietnam needs to ensure effective implementation and enforcement of rules and laws, specifically the 2017 Fisheries Law. In 2019, the European Commission commented that (i) the Fisheries Law has been implemented and the guiding documents have been put into practice; (ii) there has been a significant improvement in the monitoring, control and supervision of fishing vessels; (iii) efforts to deploy and install a tracking device for fishing vessels (VMS); (iv) implement regulation and marking of fishing vessels in accordance with EC recommendations and attempt to manage fishing capacity. However, (i) the progress of installing vessel monitoring equipment on fishing vessels is still slow; (ii) the monitoring of fishing vessels and the use of the vessel monitoring system is not comprehensive, with many technical errors; (iii) administrative sanctions are still very limited and inconsistent among localities, especially for ships violating foreign waters; and (iv) there is no evidence to demonstrate that the competent authorities ensure adequate and correct traceability mechanisms in the processing plant. Accordingly, the EC believes that Vietnam needs to continue to improve the legal framework and law enforcement; monitor, control and supervise fishing vessels; traceability then certification of catches from catches.

In October 2022, the inspection team said that Vietnam has issued many legal regulations, mechanisms, and policies to combat IUU fishing, but the implementation at the grassroots level is still feeble. Vietnam needs to have strict legal regulations with an effective monitoring mechanism to ensure consistent and synchronous enforcement from central to local levels; improve sanctions, ensure sufficient deterrence, and severely punish all violations. In addition, it is necessary to have a plan to manage the overall aquatic resources, strictly control the import of aquatic materials for export processing; put an end to the situation of fishermen violating foreign waters. Conclusion: Vietnam continues to maintain the yellow card and it is expected that in October 2023 the delegation will have a follow up inspection and assessment in Vietnam.

Vung Tau Fishery improvement project

The Vung Tau Fisheries Improvement Project (Vung Tau FIP) was initiated in October 2016. Fishery Progress acknowledged as a basic FIP in July 2021 and MarinTrust acknowledged as an Improvement Program in February 2022. The FIP Vung Tau is at the stage of implementing a fisheries action plan, whereby an appropriate BRVT trawl fishery management plan will be developed and handed over to the direct stakeholders, firstly the Sub-Fishery Department of BRVT, to maintain after the Vung Tau FIP project ends.

An appropriate fisheries management plan is based on (i) A governance structure that is accepted by the key players and provides an avenue for discussion and participation in the decision-making processes; (ii) Clear objectives for the biological, ecological, social and economic aspects of the fishery; (iii) Sources of information and data that stakeholders and government can use to evaluate how the fishery is performing against the objectives they have set; (iv) A set of management rules designed to ensure that catches are controlled and the

benefits of accessing the fishery resources are distributed in accordance with government policy; (v) Mechanisms for ensuring compliance to those rules, which are backed by legislation; (vi) A feedback and review mechanism to ensure that the management is kept up to date and is delivering on expectations.

The Vung Tau FIP project focuses on issue (iii), related to fisheries data and information. An interim guidance on data needs for assessing and monitoring the fish resources in the multispecies trawl fisheries of Ba Ria-Vung Tau, Vietnam has been developed and peer-reviewed by the third quarter of 2022. This guidance proposed mechanisms to regularly collect the necessary data and information, so that stakeholders and authorities can use them to assess fisheries performance against targets set by the government.

The Vietnamese government itself manages a national fishery database. This database is now not accessible by the private sector so the quality of the data cannot be confirmed. Nor can this data be used for the MarinTrust required traceability of the fishery from fishing ground to landing port. Database templates for multispecies fisheries are either non-existent or interviewed parties around the world are not willing to share.

A relatively simple system of data collection, storage, analysis, and visualization needs to be developed and implemented by the project itself, realizing that at some point it may have to be merged or linked to the national fishery database.

Goal of the project

The work of the fish meal chain data collection and visualization' Technical Advisor includes:

- Review the current fishery database developed by FIP Vung Tau and bullet point suggestions for improvement.
- Design fish meal chain data collection (methodology, hardware, software, training requirements for users) and report.
- Design fish meal chain data visualization (methodology, hardware, software, training requirements for users) and report.

1 Database organization

The database provided of the Vung Tau FIP in Airtable is at this time not suitable for consistent data collection and visualization. The table contains redundant information, information is not well structured, not yet complete and information in one column is not always uniform described and can therefore not be used for selection of data and linking with other tables. To enhance the quality of the database, the following steps could be taken.

1.1 Describe the process in a clear narrative.

Although not an official step in the database design process, having a clear narrative of the process often helps to clarify the process, determine uncertainties, and define relations and definition. A process narrative is a written description of a process that describes in detail the steps undertaken in a process. It seeks to explain what happens at a step in your process and describes the equipment used, the purpose of the step, any interactions with people and raw materials or products involved. Steps in a process narrative are:

Step 1: Define the process and its scope. ...

Step 2: Organize the steps. ...

Step 3: Describe who is involved. ...

Step 4: Note down exceptions to the normal process flow. ...

Step 5: Add control points. ...

Step 6: Review and test the process.

More information can be found at https://www.nuclino.com/articles/process-documentation

1.2 Define stakeholder information needs.

This entails describing the scope of the database. The project works with several stakeholders and although the scope of the project is clear, the needs in terms of information of all stakeholders may not yet be well described. This includes finding out what information they need, what information is provided by other organizations, and how far their needs for information are being met. A needs assessment can be carried out by interviewing people individually, organizing a focus group discussion or by asking potential users to complete a survey form. This needs assessment then is a basis to determine which data needs to be present/collected to generate the needed information.

Apart from these direct stakeholder information needs, there may also be incentives generated from the information in the database that may help stakeholders to participate in the map (e.g., maps of the

hauls in combination with their catch, may be an incentive for fishers to participate since it may help them in increasing efficiency and lowering costs). It is important to collect only essential information. Too much information can be confusing.

1.3 Define and describe data and its characteristics.

The FIP project is new for Vietnam and deals with many stakeholders. To ensure that all parties have the same language, and that definitions and interpretations of key terms are the same for everybody, it would be good to clearly describe and define standards for the project. Data Standards are rules that define the way data are collected, stored, and represented. Standards provide a commonly understood reference for the interpretation and use of data sets.

By using standards, different stakeholders will know that the way their data are being collected and described will be the same across different phases of the project and that they are all on the same page. Using Data Standards as part of a well-crafted Data Dictionary can help increase the usability of your research data and will ensure that data will be recognizable and usable beyond the immediate team.

A Data Dictionary is a collection of names, definitions, and attributes about data elements that are being used or captured in an information system, or as part of a research project. It describes the meanings and purposes of data elements within the context of the project, and provides guidance on interpretation, accepted meanings, and representation. Data Dictionaries are useful for several reasons. In short, they:

- Assist in avoiding data inconsistencies across a project.
- Help define conventions that are to be used across a project.
- Provide consistency in the collection and use of data across multiple members of a research team.
- Make data easier to analyse.
- Enforce the use of Data Standards.

Data Standards are rules that govern the way data are collected, recorded, and represented. Standards provide a commonly understood reference for the interpretation and use of data sets. An example of a data dictionary is given in the following for Haul information

Definition: Haul information is the relevant information about one haul done by one vessel to catch trash fish.

Haul information contains the following information:

Column	Description	Units	Source
Haul-ID	Unique identifier to describe the haul	Text	Uniquely assigned
Vessel-ID	Unique identifier to describe the vessel that did the haul. Links to a database table with vessel characteristics	Text	From MARD vessel database

Port-ID	Unique identifier of the port where the contents of the haul are brought to land. Links to a database table with port information	Text	From FIP port database
Buyer-id	Unique identifier for the buyer who purchased the batch in the port. Links to a database with buyer information	text	From FIP Buyer database
Date_start	Start date and time of the haul	dd:mm:yyyy hh:mm	Collected by fisher
LongitudeStart	Longitude coordinate at the beginning of the haul at time date_start as obtained through GPS readings in WGS84	XXX.XXXXXX	Collected by fisher
Latitudestart	Latitude coordinate at the beginning of the haul at time date_start	XX.XXXXXX	Collected by fisher
Date_end	End date and time of the haul	dd:mm:yyyy hh:mm	Collected by fisher
LongitureEnd	Longitude coordinate at the end of the haul at time date_start	XXX.XXXXXX	Collected by fisher
LatitudeEnd	Latitude coordinate at the end of the haul at time date_start	XX.XXXXXX	Collected by fisher
Catch	Volume of trash fish caught in Kg	Kg	Collected by fisher

A data dictionary is not static but needs to develop together with the project when needs of the project change. When these definitions are prepared, the project should investigate the relationships between the tables.

1.4 Determine data source and data ownership.

Part of the data is already collected and owned by different organizations and other data needs to be collected by the project. For sustainability and clarity of ownership and responsibilities, it is recommended that a database for the FIP is not seen as one physical database on one location, but rather as a set of datasets that can are using different software and can be based all over Vietnam. It is important to describe these data and arrange how access to (parts) of these data can be arranged. There are in principle two ways to arrange this:

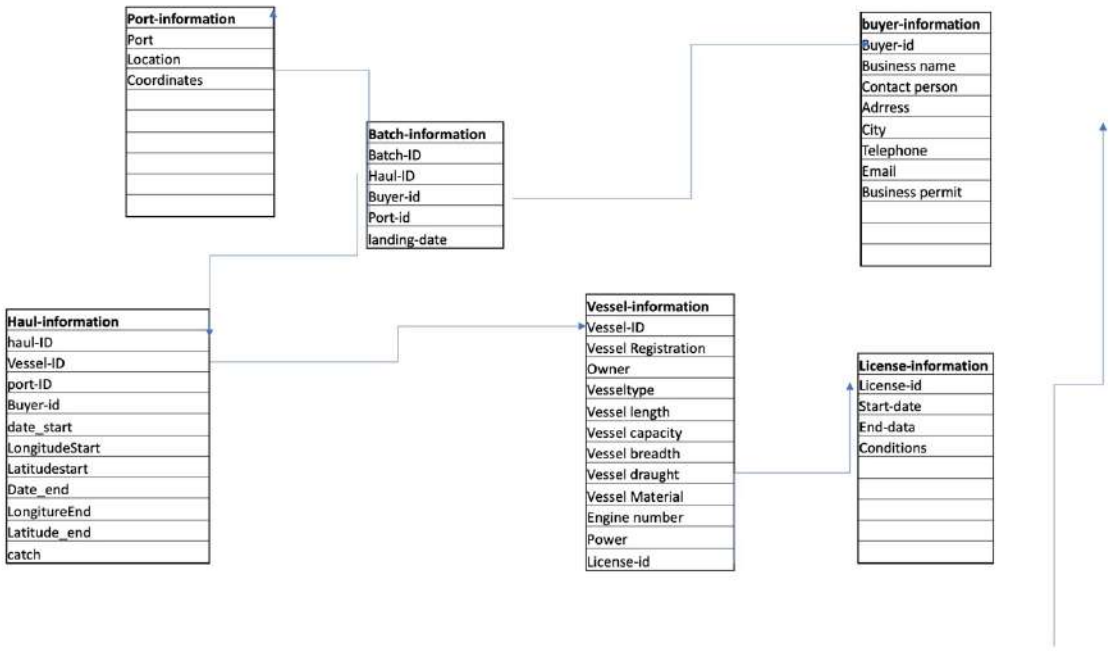
1. Continuous access via the internet to (subsets) of data via the web

2. Agreement on when (subsets) of data will be sent to the FIP Vung Tau for integration in the database.

While the first option is to be preferred, it can also be imagined that for instance, vessel and license data are retrieved from MARD on a yearly basis and locally stored at the FIP. To make interconnection of the different datasets possible, having unique ID's and unique key fields in the databases necessary so that tables can be connected, and information can be shared.

1.5 Relationships between data

Determine relationships between tables. Part of the database development process is defining the relationship between entities (tables) to reduce data redundancy and provide clear relationships between data for visualization and analysis. An Entity Relationship (ER) Diagram is a type of flowchart that illustrates how "entities" such as people, objects or concepts relate to each other within a system. ER Diagrams are most often used to design or debug relational databases. They use a defined set of symbols such as rectangles, diamonds, ovals and connecting lines to depict the interconnectedness of entities, relationships, and their attributes. A visual display of the entity relationship diagram based on the current database could look like the following figure.



These diagrams also help in defining the structure and relationships between entities. One buyer has only one and no more or less than one license (one to one relationship). Or one vessel has only one owner, but one owner can own more than one ship (one-to-many).

2 Data collection

Within the FIP, there is a need for data coming from different sources. Some of these data exist and are collected my other organizations, there is also information that is new and needs to be collected by stakeholders within the FIP. If possible, these data should be collected digital and using only one platform. Digital data collection standardizes collection workflow; provides options for pre-defined answers and checks and balances; integrates digital tools like GPS, camera, sound and QR codes; and safes time and reduces errors since encoding of paper forms is no longer needed.

Both Open Data Kit (ODK) and Kobo toolbox are tools that have proven capabilities for digital data collection in a whole range of environments all over the globe. They have a module that allows of online and offline data collection using digital survey form on mobile phones. Surveyors can install an app on their device, download one or more survey forms and enter the data (including location, photo, video, speech and more). The data can then be automatically uploaded to a server. The server takes care of distribution of empty forms to the devices of users and storing and basic visualization of the results of the survey. Data can be easily downloaded to Excel, GIS, or business intelligence tools like PowerBi or Tabeau for further analysis and presentation. Survey forms can be made using excel or with online tools provided. The tools are open source and free to use and both adhere to the OpenRosa standard for digital surveys. KoBo Toolbox also provides the option for distributing forms via web browsers. More information on setting up a data collection project and the workflow can be found in Annex 1.

Using these tools for the FIP has a few advantages:

- There is limited expertise needed to set-up and maintain the server side since most of the options are already provided and generating forms is relatively easy.
- Collected data can be uploaded automatically when a user is within reach of WIFI, and the data are stored digitally and secure.
- The database on the server has basic analysis and visualization options that can be used for progress monitoring.
- Data can be (real time) exported to other tools like excel, GIS or business intelligence for full visualization and analysis.
- Since data collection can be done using the devices of the users, no additional investment is needed and the learning how to the use the tool for data collection is easy. A training of half a day may be enough.
- The collection tools can be made in Vietnamese or be made multilingual where a user can select the language.

For this project, I would recommend starting a data collection project using Kobo toolbox. The server is free to use, can accommodate multiple survey forms and allows for data entry using mobile devices and through the internet. The data are password protected. In case the data collection using mobile devices works, but a more secure database is needed, then consider using ODK to download the database software to a dedicated secure server. Since the survey forms etc. are all conforming to standards, there should be limited to no effect on the users. In order to give the project, the possibility to kick start the digital data collection, a set of resources on how to set up a digital data collection project have been shared with the FIP Vung Tau.

2.1 Training needs

To start a successful trajectory with Kobo Toolbox, two types of users and trainings are foreseen.

1 Kobo Expert, staff who after the 3-day raining will be able to:

- Setup a data collection project with Kobo Toolbox
- Prepare data collection forms using Excel and/or the online form generator.
- Manage the data and database in Kobo Toolbox
- Train and support data collectors in the app installation and usage

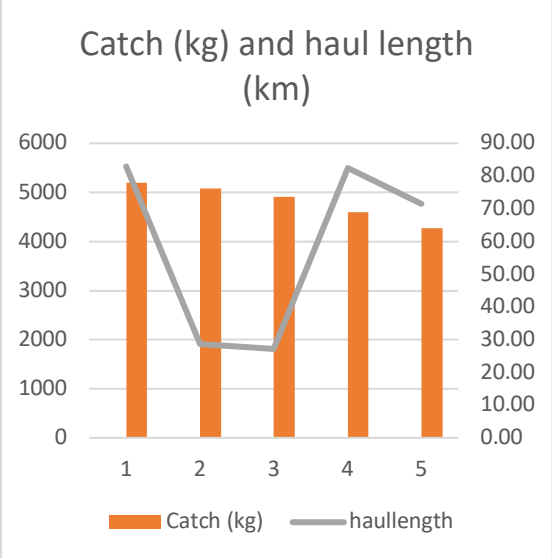
2 Data collectors, who after a one-day training

- Download and setup up the app given specific conditions.
- Download required forms for the survey.
- Perform a survey and upload results.

3. Geographic data

At this point limited geographic data is collected by the project. Depending on the needs of the FIP Vung Tau, there are several options. If only visualization of the geographic data is needed, tools like Google Maps, Google Earth, KoBo toolbox or Business intelligence tools like PowerBI suffice. These can visualize geographic data against a selection of backgrounds. However, if a further analysis of geographic data is desired, then developing a fisheries database in a relational database with geographic capabilities is recommended. The geographic analysis can then be performed in the database and the results can be visualized either using a GIS web application or directly in the business intelligence software.

- Relevant are the beginning and ending coordinates of every haul which are collected as point information. For analysis and visualization, the hauls may be better represented as line data. Coordinate pairs can be converted into text that can be recognized as line input by reformatting this into the WKT format (Well Known Text). For lines the format is: LINESTRING (0 0, 0 1, 1 2). In future, when using a digital data collection tool, there is the option to either collect begin and end points or collect these directly as line item. In this case also an automated collection of points can be defined so that also non-linear hauls can be visualized correctly.
- Another advantage of using lines instead of points is that from lines it is easy to calculate the actual length of a haul. This could be used to both as an incentive to participating fishers (knowing how many kg/km they caught may help in decision making on where to fish and being able to see their hauls (and possibly those of competitors) on a map may also give insights. On the other hand, deviations in average catch/km may also be a source for verification and checks and balances by an authority.
-



- When copying the coordinates from paper, it is important to have 5-6 digits to have an accuracy in meters when plotting the points. A lesser number of digits could decrease the accuracy to hundreds of meters or more.
- Geofencing is a location-based service that triggers an action if an element that has GPS, RFID or other location features enters or leaves a specific predefined area. With the location

information of the fishing vessels, GIS software can check whether a vessel has been inside or outside, marine protected areas, national or international boundaries etc. This could be used as a check for sustainable fisheries.

- At this point, in the FIP process, geographic analysis is not needed and training not necessary. However, if KIM Delta decides to upgrade its skills, QGIS (www.qgis.org), a widely used and accepted open-source GIS package would be recommended. Basic GIS trainings usually take a week, but QGIS comes with an expansive and good online tutorial (https://www.qgistutorials.com).
- In order to facilitate the mapmaking in QGIS, downloading the plugins for Quick Map Services and/or the Google Earth plugin. Using these plugins it is very easy to set backgrounds for your maps based on online data from OpenStreetMap, NASA or Google Maps

3.1 Training needs

A five-day training could look like the following, but can easily be adapted to needs:

Module 1: What is GIS A module which focuses on the concepts and principles of GIS. A selection of the topics that will be addressed will be concepts and principles of GIS, different types of GIS data in use, a set of examples of GIS in use worldwide. This whole part will be done without you using the computer.

Module 2: introduction to QGIS

In this module the principles we have learned in module one will begiven hand and feet by using QGIS. We will be dealing with the user interface, how to organize your data in projects and how to import geographic data. The module will end with an overview of the most important QGIS components.

Module 3: data collection

Getting the right data for your GIS is one of the most important issues. In this module we will deal with four important ways of collecting data. The first is in the field using a GPS, the second one is geo-registration which deals with preparing scanned maps and digital images for your GIS. Getting data from Android data collection tools and finally those that are available on the web.

Module 4: editing

In many cases, the data we have added need some fixing or editing. In this module we will be making our new drawings and add or change the necessary attribute data to maps and in the database. We will also discuss how to calculate features based on your maps.

Module 5: Analysis

A big added value of using a GIS is that we have many ways to create additional value to our data and one important way is analyse one (or more datasets). In this module we will discuss the selection tools asway of analysing data and some ways to create new data to gain new insights in a structured way. This module will be capped with some real-life analysis exercises.

Module 6: Presentation

"A Map says more than a thousand words". In this module we will treat the visual qualities of maps and how to make high quality maps and atlases using QGIS.

4 Visualization

With respect to data visualization, there are number of key considerations:

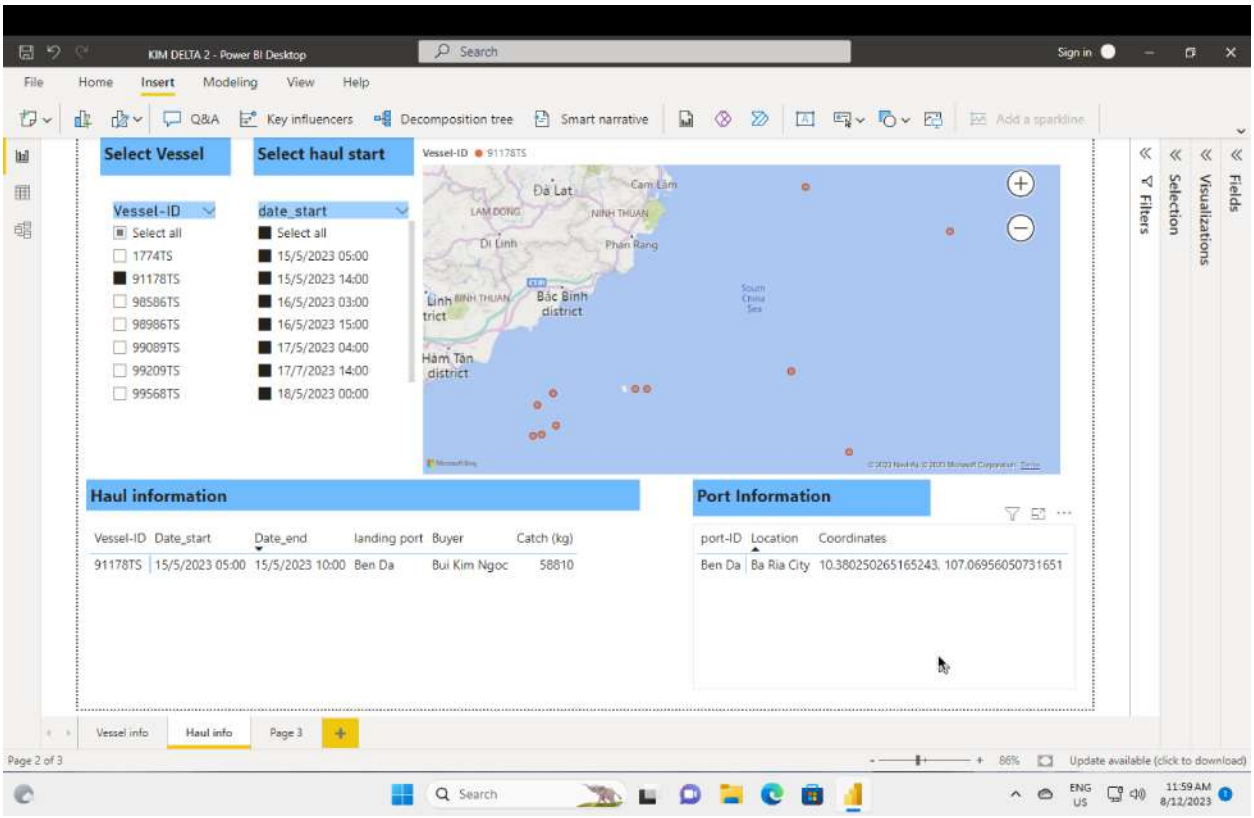
- FIP data are collected and owned by different organizations and are stored at different locations. The visualization tool should be able to collate this information real time or at agreed intervals and let ownership and responsibility for the quality of the data with the owners as much as possible.
- Different stakeholders have different needs and aggregation levels so the software should be able to generate multiple dashboards, each suitable for different stakeholders.
- Data sharing, if possible, the dashboards should be shared using the internet.
- The software should be flexible to grow with the needs of the FIP.

I would recommend a business intelligence software like PowerBI or Tabeau for visualization of the data, exactly because this software is adept in using data from many different sources (both online and offline), can combine these into easy to interpret dashboards and can share data online. I have experience with so this part will focus on this software, but here is an overview of differences and similarities between PowerBi and Tableau (https://www.simplilearn.com/tutorials/power-bi-tutorial/power-bi-vs-tableau#:~:text=Power%20BI%20tends%20to%20drag,degree%20view%20of%20your%20data.). However a main difference is that PowerBi desktop is free for most users, whereas Tableau does not have free options.

Microsoft Power BI is a business intelligence (BI) platform that provides nontechnical business users with tools for aggregating, analysing, visualizing, and sharing data. Power BI's user interface is intuitive for users familiar with Excel, and its deep integration with other Microsoft products makes it a versatile self-service. Power BI is used to find insights within an organization's data. Power BI can help connect data sets, transform, and clean the data into a data model and create charts or graphs to provide visuals of the data. All of this can be shared with other Power BI users within the organization. In the case of the FIP, it can load data from the different databases and use these to build new tables in PowerBi, specifically for visualization.

PowerBI desktop is a free Microsoft business intelligence tool that can be used to generate dashboards that can be either printed or shared online within an organization. It can be used to make interactive personalized dashboards and reports, based on static or with real-time information from a wide array of data sources. PowerBI only works on Windows PC's, but according to the user community, a web-based version is under development.

The information in the dashboards is not static, but dynamic. It is possible to enter filter tools which make it possible to filter on specific data (for instance vessel-id, or haul-id) and then display data only for selected data. And examples two dashboard pages made with Power BI based on the data from Kim Delta are shown below: (a more dynamic short video on the operations and contents of the dashboard has been shared online with the project).


KIM DELTA 2 - Power BI Desktop
Search
Sign in
File Home Insert Modeling View Help
Q&A Key influencers Decomposition tree Smart narrative
Select Vessel
Select haul start
Vessel-ID
Select all
1774TS
91178TS
98586TS
98986TS
99089TS
99209TS
99568TS
date_start
Select all
15/5/2023 05:00
15/5/2023 14:00
16/5/2023 03:00
16/5/2023 15:00
17/5/2023 04:00
17/7/2023 14:00
18/5/2023 00:00
Vessel-ID 91178TS
Đà Lạt
Cam Lâm
LAM DONG
NINH THUAN
Di Linh
Phan Rang
Bắc Bình district
Hàm Tân district
South China Sea
Haul information
Vessel-ID Date_start Date_end landing port Buyer Catch (kg)
91178TS 15/5/2023 05:00 15/5/2023 10:00 Ben Da Bui Kim Ngoc 58810
Port Information
port-ID Location Coordinates
Ben Da Ba Ria City 10.380250265165243, 107.06956050731651
Filters
Selection
Visualizations
Fields
Vessel info
Haul info
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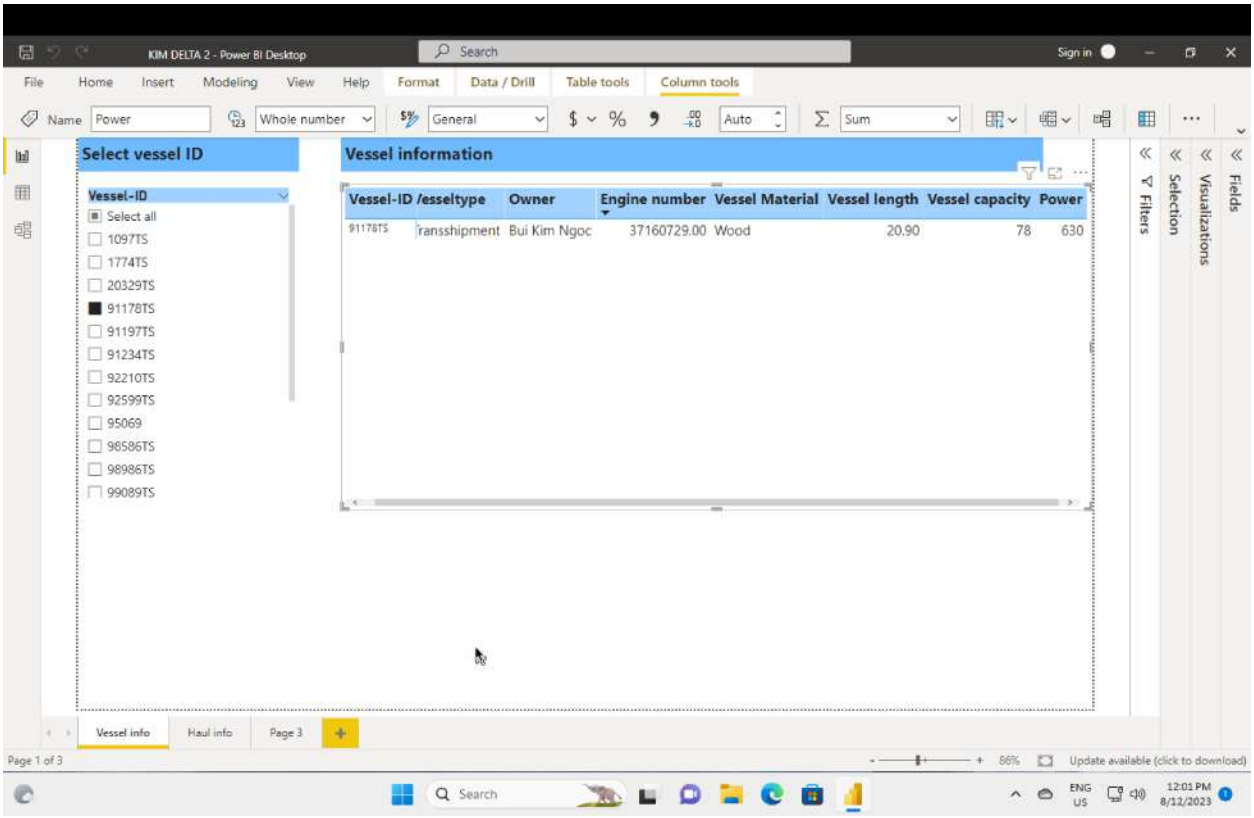
KIM DELTA 2 - Power BI Desktop
Search
Sign in
File Home Insert Modeling View Help Format Data / Drill Table tools Column tools
Name Power
Whole number
General
Auto
Sum
Select vessel ID
Vessel-ID
Select all
1097TS
1774TS
20329TS
91178TS
91197TS
91234TS
92210TS
92599TS
95069
98586TS
98986TS
99089TS
Vessel information
Vessel-ID /esseltype Owner Engine number Vessel Material Vessel length Vessel capacity Power
91178TS ransshipment Bui Kim Ngoc 37160729.00 Wood 20.90 78 630
Filters
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Fields
Vessel info
Haul info
Page 3
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Using the PowerBi services, dashboards can be shared online, also outside of the organization and there are options to limit the information people have access to, based on their email address. Users can make selections and view aggregated data but have the option to select individual occurrences of the data.

4.1 Training needs

In my experience, the visualization part of PowerBi is not specifically hard to learn, but even with a lot of Excel experiences, there are some quirks in the programming language that can make programming and calculations difficult. These skills are needed however to generate specialized tables from different sources that can facilitate visualization.

Personally, I have mixed feelings about the 3-day training I received from Microsoft Philippines. The training was in my opinion too much focused on economic business reporting, and less on situations like this. I also had a feeling they balanced between training and keeping options open for their consultancy department. The user community however is very good and very active, and I have almost always received answers to my questions within 48 hours.

https://powerbi.microsoft.com

https://community.fabric.microsoft.com/t5/Microsoft-Power-BI-Community/ct-p/powerbi

Annexes

Annex 1: Mobile data collection project design

KoBo toolbox is a suite of tools that allows data collection using mobile devices, and data submission to an online server, even without Internet connection or cellphone signal at the time of the survey. KoBo Collect is the tool for data collection that can be used in the field while the free database on the server accepts both the forms and the collected data. Once data have been collected with KoBo Collect, these can be uploaded and managed using the KoBo server. This server can send the data to external applications; allows users to download the datasets in aggregated formats, such as the comma-separated-value (CSV) file format; and can generate basic graphs and basic maps.

Programming skills are not required to start a KoBo project. To present the geographic results, the use of Google Earth is strongly recommended because of its visualization capabilities and ready availability. The preparation of the forms is easily done using Microsoft (MS) Excel, but KoBo also provides and easy to use online form builder. Using KoBo toolbox differs from Geotagging because it has the option to generate complete surveys which may contain a plenitude of data, including location. Geotagging can be defined as adding geographical identification metadata to various media such as a geotagged photograph or video, websites, SMS messages, among others. As such the use of KoBo can be more comprehensive since it does not limit itself to just location info on a media file.

Before starting a survey using KoBo toolbox, the technical infrastructure for the mapping project must be set up first, broken down into three steps:

• Setting up an ODK Aggregate website.

• Preparing survey forms; and

• Setting up Android devices for mapping.

KoBo toolbox server

The KoBo toolbox sever provides a repository and user interface to manage and extract data to fill other formats and can be used both online and offline. The server can receive and store data from any device or other application which conforms to the OpenRosa standards \ and is therefore not limited to Android. Most users can just open a free account on KoBo toolbox to gain access to the server. Once access is gained, the server can host multiple survey forms, and each form can be provided with different access for users etc. This is a free service for moderate use and makes data storage in the cloud possible and provides an upload option for mappers and surveyors from any location with WIFI, while no WIFI or data plan is needed during the actual field survey.

KoBo Collect is a mobile client that runs on any Android device (An alternative is available for IOS). KoBo Collect accepts OpenRosa based survey forms and turns these into digital survey forms that can be easily navigated and filled in by the users, a simple case of answering questions, many with

predefined answers; then swipe to the next page. Answers to questions can be in one of the following types: free text, integer, decimal, select one, select many, location (from GPS), image, video, audio and barcode. KoBo Collect supports checking of data and branching and looping of questions depending on previous answers. KoBo Collect stores the data in XML format on the device, which can be transferred to the server either online or offline. The KoBo Collect App can be downloaded from the Android Play store.

There are several ways to generate forms for KoBo, but I prefer XLSForm. XLSForm is a tool designed to simplify the creation of survey forms. XLSForm will convert forms authored in Excel into XForms that can be used with several web or mobile platforms (xlsform.org). Using MS Excel and a basic structure, it is possible to generate simple forms, but it also has the option to generate complex survey forms. After the forms have been created using MS Excel, they must be converted into XML format for uploading to the server. In the cases described below, the conversion was done on-line using the website http://opendatakit.org/xiframe/.

This site converts MS Excel files to XLSForm format and tests for the syntax and errors in the files, after which the MS Excel file will be converted into XML and can be downloaded to the computer of the user. Forms can be tested online in Enketo or the Kobo Toolbox. This will open a new tab in the browser and will preview the form like how it will look in Android devices. A correct form can then be uploaded to the ODK aggregate server to be shared with surveyors.

The KoBo server has basic options for visualizing data, but it can also export data in different formats for further usage. Options are export to KML (Keyhole Markup Language) for presentation in Google Earth and in CSV (Comma Separated Value) format for further processing in MS Excel and QGIS, a free and Open-Source Geographic Information system, or any other desired software package.

Setting up KoBo collect on a user's device is a matter of downloading the app from Play store and copying the project from a QR code provided by the project. After this can download the necessary empty forms (which can be used multiple times) and perform the survey. The app can be set that the results of the survey will be uploaded automatically once the device is within reach of WIFI, so no data or LTE is needed during the survey.

Resources:

https://www.kobotoolbox.org The main site of Kobo Toobox

https://xlsform.org/en/ Instructions on how make survey forms using Excel

https://faspselib.denr.gov.ph/sites/default/files//Publication%20Files/2018-07-19_Mapping%20cacao_final.pdf A report on the use of ODK for cacao mapping in Panay, with an expansive description of the project design