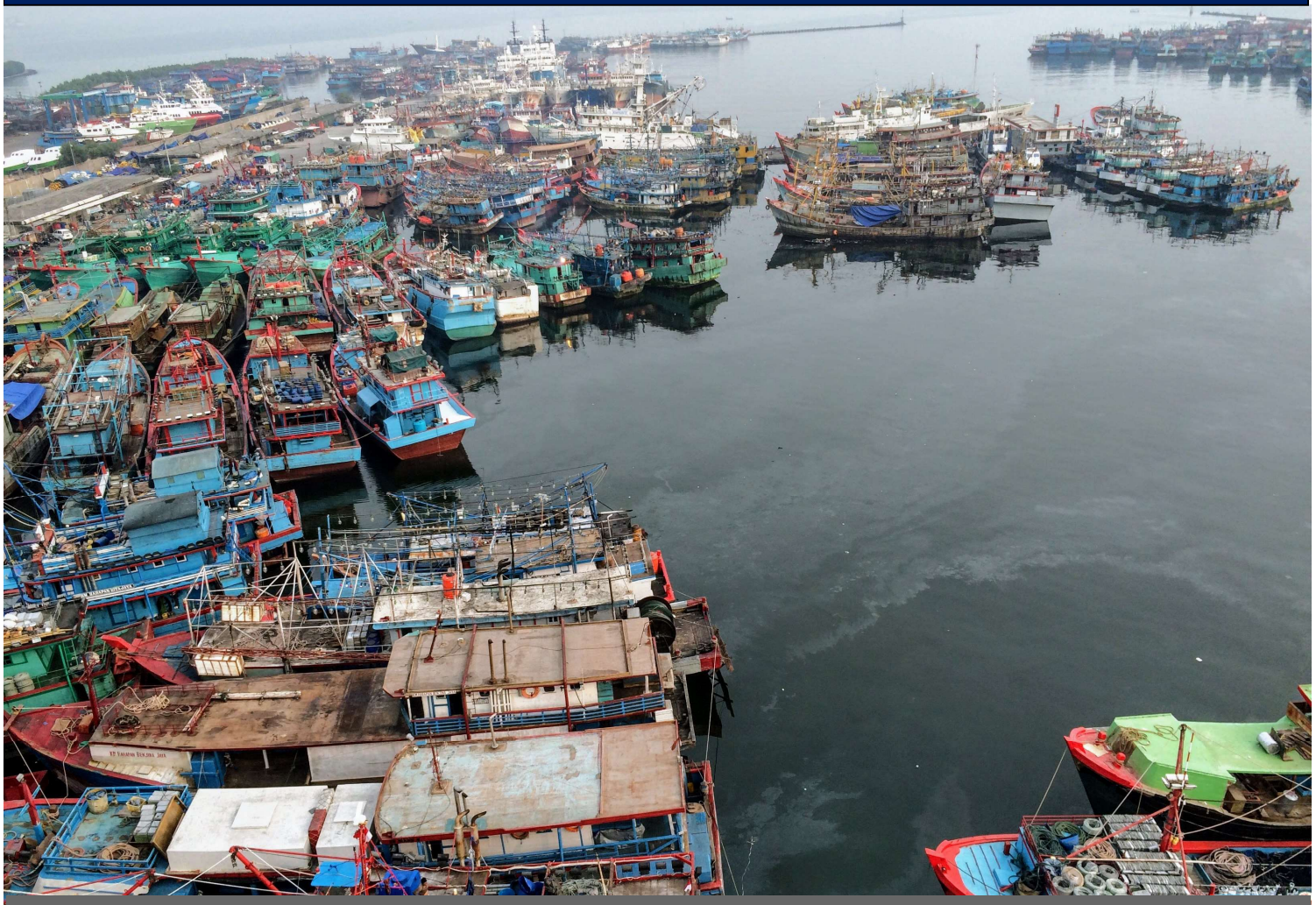
The Oceans and Fisheries Partnership (USAID Oceans)

Key Data Element Collection and Return on Investment for Electronic Catch Documentation and Traceability

Case Study | April 2020



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ACRONYMS AND ABBREVIATIONS

ACDS	ASEAN Catch Documentation Scheme
ASEAN	Association of Southeast Asian Nations
BAC	Bureau Administrative Circular
BFAR	Bureau of Fisheries and Aquatic Resources
CDTS	Catch Documentation and Traceability System
COLD	Catch Origin and Landing Document
DG	Directorate General
EU CC	European Union Catch Certificate
FAME	Futuristic Aviation and Maritime Enterprise
FIS	Fisheries Information System
FMA	Fisheries Management Area
GT	Gross Ton
IUU	Illegal, Unreported and Unregulated (fishing)
KDE	Key Data Elements
LGU	Local Government Unit
MMAF	Ministry of Marine Affairs and Fisheries
NOAA	National Oceanic and Atmospheric Administration
NFC	Near Field Communications
NGO	Non-governmental Organization
PPP	Public-Private Partnership
ROI	Return on Investment
SIMP	Seafood Import Monitoring Program
SEAFDEC	Southeast Asian Fisheries Development Center
STELINA	Sistem Telusur dan Logistic Ikan Nasional (National Fish Search and Logistics System)
USAID	United States Agency for International Development
USAID Oceans	USAID Oceans and Fisheries Partnership Activity
USG	United States Government

EXECUTIVE SUMMARY

This study of traceability technology in the Philippines and in Indonesia is in two parts. The first part focused on key data element (KDE) collection, exchange, and verification; and KDE privacy processes, their effectiveness, and their relation to government electronic catch documentation and traceability (eCDT) systems and compliance with the U.S. Seafood Import Monitoring Program (SIMP). The second part of the study analyzed the return on investment (ROI) for implementing eCDT solutions in the study sites.

In the Philippines, researchers found that, if implemented effectively and as designed, the country's eCDT system has the potential to significantly streamline KDE verification and export documentation process. The system can allow the Philippines Bureau of Fisheries and Aquatic Resources (BFAR) to focus its efforts on improving oversight and verification of catch and traceability across the supply chain, and specific regulatory and design improvements were identified that would improve the system.

In Indonesia, the study similarly found that, if the Indonesian Ministry of Maritime Affairs and Fisheries (MMAF) is able to overcome the significant administrative hurdles to implementing its prototype eCDT system, STELINA, the quality of Indonesia's fishery data and supply chain traceability would greatly improve and ultimately simplify the export documentation process.

In both the Philippines and Indonesia, SIMP compliance appears to be robust as exporters often have many years of experience complying with export documentation requirements.

Regarding ROI, the study considered vessel tracking and point of catch reporting technologies Futuristic Aviation and Maritime Enterprise (FAME) and Pointrek, as well as TraceTales, an internal processing facility traceability system. Of these three technologies, it was possible to calculate an estimated ROI for Pointrek and TraceTales. Based on the estimated quantifiable benefits associated with the implementation of these technologies, a positive ROI was found. Additionally, there were significant non-quantifiable or not-yet-quantifiable benefits associated with each of the technologies considered.

FAME is still in pilot phase and ROI therefore cannot yet be calculated. However, there appear to be multiple cases where a positive ROI for the technology will be possible. For example, in instances where companies incur costs to send staff to fill out logbooks for their captains, FAME could replace these logbooks with NFC cards that log GPS coordinates and time of catch. Alternatively, for vessel owners that suspect their crew is engaging in unlawful activities such as fuel pilferage, real-time vessel tracking data could reduce these losses and cover the capital and operating costs of the FAME system. In addition, with new logbook regulations in place for small-scale vessels in the Philippines, FAME is well-positioned as a low-cost option to help fishers and captains with compliance.

1. OVERVIEW

Background

On behalf of the USAID Oceans program, Marine Change conducted a two-part study in the Philippines and in Indonesia. The first part of this study focused on KDE collection, exchange, verification, and privacy processes/effectiveness and their relation to government eCDT systems and US SIMP compliance. The second part of the study analyzed the ROI for implementing eCDT solutions.

In the Philippines, the Philippines BFAR is in the process of introducing a nationwide eCDT system known as eCDTS. Similarly, the Indonesian MMAF has introduced a prototype of a new eCDT system called STELINA. Both of these systems have the potential to significantly streamline the KDE verification and export documentation process in each country, allowing the respective governments to focus their efforts on improving oversight and international competitiveness.

Methods

ROI calculations were attempted for four technologies currently in use or being piloted in the Philippines and/or Indonesia: real-time vessel tracking system FAME and Pointrek, plus internal processing facility traceability systems Tally and TraceTales. While the benefits of these technologies are often difficult to quantify, in some contexts and under some scenarios it was possible to quantify ROI.

Data was gathered for the studies by interviewing key government and supply chain actors in both the Philippines (Manila and General Santos, October 2019) and Indonesia (Bitung, November 2019 and Jakarta, January 2020).

Findings

In the Philippines, researchers found that, if implemented effectively and as designed, the country's eCDT system has the potential to significantly streamline the KDE verification and export documentation process. The system can allow BFAR to focus its efforts on improving oversight and verification of catch and traceability across the supply chain and specific regulatory and design improvements were identified that would improve the system.

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2. KDE COMPLIANCE AND eCDT SYSTEM IMPLEMENTATION: THE PHILIPPINES

BFAR, with assistance from USAID Oceans, is developing an eCDT system, or "eCDTS", with the goal of digitizing the current paper-based system used for KDE collection, exchange, and verification for traceability and export documentation. The system could greatly streamline the documentation process and improve regulatory compliance. In development since 2017 and still in the testing phase with First Mover companies, eCDTS is expected to be fully operational in 2020.

Data in the Philippines was gathered through semi-structured interviews with officials from the following organizations:

Figure 1. Interview subjects in the Philippines

Manila	# of participants	General Santos	# of participants
USAID Oceans	2	USAID Oceans	2
BFAR Fisheries Information Management Center	2	SOCSKSARGEN Fishing Federation and Allied Industries, Inc.	2
BFAR Fisheries Registration and Licensing Division	2	BFAR Licensing and VMS Supervision Division	2
WWF Philippines	2	BFAR Export Documentation Division	2
USAID Fish Right	1	Philippine Fisheries Development Authority	1
Fresh/frozen tuna processor and exporter	2	8 eCDTS First Mover Companies	16
FAME	3	Municipal fishers, vessel owners, and traders	40

2.1 Summary of current regulations: KDE collection, exchange, and verification for traceability and export documentation

BFAR has jurisdiction over all Philippine-flagged commercial vessels, defined as those greater than 3 gross tons (GT). Vessels under 3 GT are referred to as "municipal vessels" and fall under the jurisdiction of the local government units (LGUs). Current regulation states that commercial vessel unloading events at port must be witnessed and documented by BFAR staff, who are meant to be at each port at all times in anticipation of vessel landings.

Upon landing, commercial vessels are required to present the following paper documents for verification by BFAR:

- **Logbook:** completed daily by vessel captains; must be compared to VMS data and stamped
- **Vessel license**
- **Brailling certificate**: documents the transfer of fish from catch to carrier vessel. Applicable to purse seine vessels only as catch is immediately offloaded onto a carrier; must be signed by the captains of both the capture vessel and the carrier vessel.
- **Stowage plan**: applicable to carrier vessels transporting purse seine catch only.

The vessel data from these documents, which are all completed by capture and carrier vessel captains, are used by BFAR to fill out the first section of a paper-based **Fish Unloading**

Monitoring Report (FUMR). This step in the catch validation process is referred to as the "first border inspection" and requires BFAR staff to observe the complete process of unloading, fish classification, weighing, and reloading onto transport vehicles. For very large vessels, this complete process can reportedly span three days from start to finish. Current regulation states that one FUMR must be generated for each commercial vessel landing event. Once FUMR documentation is complete, the BFAR Export Documentation Division automatically issues the signed and approved FUMR to the fishing company and a copy of the document is filed away by BFAR at their offices.

Prior to FUMR issuance, the BFAR Licensing and Vessel Monitoring System (VMS) Supervision Divisions must compare the GPS coordinate data in the submitted logbooks to the VMS data. Since 2018 all commercial vessels in the Philippines have been required to have onboard VMS and digitally transmit position data to BFAR. Once the data is manually verified, BFAR stamps the logbook as validated.

Once fish leaves the port, the "second border inspection" begins.[1] Regardless of whether the landed fish is transported to cold storage or directly to processing, each transport vehicle must carry a **Cold Storage Warehouse Deposit Slip (CSW-DS)**. This is a traveling document that stays with each transport vehicle. Second border inspection requires BFAR staff at port, at the truck scale, and at the cold storage or processing plant to verify traceability. Once this document arrives at the cold storage warehouse or processing plant, it is retained by BFAR.

For fish placed in cold storage prior to processing (up to 3-4 months), the BFAR Second Border Inspector will complete a **Cold Storage Warehouse Withdrawal Slip (CSW-WS)**. This traveling document requires signatures of second border inspectors at the cold storage facility, at the truck scale, and at the processing plant to verify traceability.

For a catch that goes directly to the processing plant, the BFAR Second Border Inspector will complete an **In-plant Receiving Monitoring Report (IPRMR)**, effectively a receiving document into the processing plant, which can accommodate up to eight truck landings. This document includes KDEs for detailed classification data that is not included in the CSW-DS or CSW-WS.

Once these documents are completed, their KDEs are compared and verified by multiple BFAR staff: an evaluator that completes the data, an endorser that double-checks the data, and an approver that checks the data again. Once the data is verified and the processing company provides a **fish weight slip**, an internal processing company receiving document analogous to an IPRMR, a signed and stamped **Catch Origin and Landing Document (COLD)** is issued. For capture vessels above 20 GT, one COLD per vessel is required, i.e. multiple COLDs per FUMR is likely for purse seine as carrier vessels regularly transport catch from multiple capture vessels. For capture vessels below 20 GT, multiple vessels may be included in one COLD.

Once the COLD is approved by BFAR and automatically issued to the fishing company, the processing company then must apply for a European Union Catch Certificate (EU CC) if the consignment is bound for the EU. An EU CC must be issued by a competent local authority, i.e. BFAR. The exporter must submit the following documents to BFAR for each EU CC:

- One **COLD** plus all attachments
- **Pre-shipment inspection report** issued by BFAR after inspecting a sample of products to confirm conformity with the documentation provided
- **Health certificate,** which the exporter applies for online and is then issued by BFAR. In eCDTS this is simply identified using a reference number.
- **Packing list** (as attachment)

[1] BFAR hired 40-50 new staff to implement second border inspections when they began in 2019.

- **Bill of lading** (as attachment)
- **Export permit, commodity clearance, and export declaration** (customs documents as attachments)
- **EU CC application**, which is submitted online by the processing company

To be acceptable to the EU, each COLD and EU CC must be signed and stamped by hand by the local competent authority (i.e. BFAR). One consignment will require multiple EU CCs if the goods exported were sourced from multiple vessels above 20 GT.

FUMR and COLD documents are required for purse seine-caught fish that are initially landed in the Philippines. For the significant quantities of fish caught by Philippines-flagged vessel but landed elsewhere (e.g. Papua New Guinea/PNG) and transshipped to the Philippines for processing, analogous documents from the PNG national fisheries authority (NFA) are required prior to the issuance of an EU CC.

2.2 BFAR Administrative Circular 251 and Traceability Documentation Design

As the largest export volumes from the Philippines are skipjack caught by purse seine vessels, until recently BFAR has focused its traceability efforts on this supply chain, especially for can/pouch goods as the finished product. Thus, some of the required documents above apply to purse seine vessels only. However, yellowfin (and to a lesser extent, bigeye) tuna caught by handline vessels is also a major source of exports. Handline fishing and processing companies, until very recently, have been forced to follow a traceability protocol that was designed for purse seine vessels.

Until mid-2019, the primary regulatory document governing traceability documentation was BFAR Administrative Circular number 251, known as "BAC 251." This document served as the basis for the design of traceability documentation in the Philippines and stipulated the KDEs collected. However, when designing the new digital eCDTS based on KDEs outlined in the BAC 251, it became apparent that a revision to BAC 251 was necessary if handline (and eventually other gear types) were to be included. In June 2019, an update to BAC 251, known as BAC 251-1, was approved to accommodate handline-to-fresh/frozen supply chains and purse seine-to-fresh/frozen supply chains. BAC 251-1 allows for additional amendments in the future for additional non-tuna fisheries, but these regulations have yet to be written.

The key update for BAC 251-1 relevant to handline vessels, both commercial and municipal, is the new requirement for a **Fish Catch Report**, which is essentially a simplified logbook. A second important revision is that handline vessels no longer require an FUMR, but rather can apply immediately for a COLD once a Fish Catch Report is complete, without the need for a second border inspection.

For commercial handline vessels landing at smaller ports and landing sites, some (but not all) LGUs require an **Auxiliary Invoice**, essentially a tax document for payment to the LGU based on the weight of fish landed. BFAR requires a **Local Transport Permit** (LTP), at a cost of PHP 100 per permit to enter the nearest port for sale.[2] BFAR does not currently have plans for these documents to be included in eCDTS. As there are no BFAR inspectors at these sites, FUMRs and COLDs cannot be issued for these fish. However, if the capture vessels are below 20 GT, they are still eligible for a simplified EU CC.

[2] Due to staffing constraints, BFAR has authorized LGUs to issue LTPs.

2.3 Summary of practice before eCDTS implementation: KDE collection, exchange, and verification for traceability and export documentation

Based on interviews with multiple stakeholders, actual KDE collection, exchange, and verification for traceability and export documentation in General Santos are very different in practice when compared to the regulations currently in place.

Due to staffing constraints, BFAR does not have a continuous presence at each port of landing. For handline vessels landing in General Santos Port 1, BFAR's presence is inconsistent and given the large volume of daily vessel landings (both commercial and municipal) and fish unloaded at that port, BFAR is likely on hand to witness only a small fraction of commercial vessel landings. In Ports 3 and 4, purse seine fishing companies must inform BFAR staff in advance of the carrier vessel's arrival. This is usually done one to five days in advance.[3]

For both purse seine and handline landings, each of the eight first-mover companies interviewed reported that, in practice, FUMRs are only issued upon request, and the companies themselves complete most of the documentation. For purse seine unloading events, BFAR staff are on-site for perhaps one hour of the event to fill out the basic vessel data on the FUMR form. For handline unloading events, BFAR reportedly rarely observes the unloading and again fills out only basic information whether on-site or off-site. For both purse seine and handline landings, BFAR hands over the mostly blank FUMR forms to the companies themselves, which then complete the missing information such as tonnage and species documentation.

Once the FUMR documentation is completed, it must be hand-delivered by the fishing company to the BFAR office rather than being automatically filed away by BFAR staff. The FUMR is only signed and its KDEs verified when a company applies for a COLD. Once the documents for the COLD are gathered and hand-delivered to the BFAR office, receiving a signed and approved COLD form from BFAR takes approximately one week to one month. After the COLD has been processed and additional documentation gathered for an EU CC, receiving a signed and approved export catch document from BFAR takes an additional one week to one month. An export documentation officer from one first-mover company interviewed noted that sometimes their EU CC is not issued prior to the consignment's arrival in Europe (30 days after shipment) and that they are penalized by their buyer each day until the catch certificate is provided. However, this problem could be solved once the eCDTS is fully implemented as the system could reduce the export documentation process to just two days.

For both the fishing and exporting stages of the supply chain there is at least one full-time staff per company dedicated to pursuing export documents. However, fishing companies unaffiliated with processing companies, and therefore able to sell to whomever they wish, are not willing to expend the effort to secure the government-required traceability and export documentation.[4] In these instances, it is the processing company rather than the fishing company that drives the documentation process and employs the additional required staff to collect required documents and ensure they're complete. On average, these dedicated compliance staff report visiting the BFAR office three to five days per week and spending half a day per visit pursuing documents for various consignments.

[3] Port 2 landings are bound for the local market and do not require export documentation.
[4] That is, fishing companies not owned by the same parent company as a processor can always sell to companies that do not require them to apply for an FUMR or COLD.

The delays in document issuance are reportedly caused by two primary factors. First, so many documents and KDEs are required that mistakes and omissions are very common—tonnage figures may not match exactly and required attachments may sometimes be missing.[5] For example, the collected FUMR documents may only include a copy of a logbook rather than the stamped version verified by a separate BFAR division. Another reportedly common issue is that IPRMR data sometimes doesn't exactly correspond with cold storage deposit and withdrawal documents. As a result, half or more of COLD applications are reportedly incorrect and/or incomplete.

Secondly and equally important, even if all documents have been submitted by the fishing and processing companies, it is a serious challenge for BFAR to manage all of the documentation internally, and it is reportedly very common for companies to be asked to resubmit documentation because these documents have been misplaced by BFAR.

In cases of a catch that was landed in PNG and transshipped to the Philippines, BFAR requires the PNG-equivalent of a COLD. While it is BFAR's responsibility to secure this document, in practice companies reportedly must contact PNG's National Fisheries Authority themselves in order to get the documentation and avoid export delays.

Validation of fishing grounds is also imperfect in practice. Only a small proportion of commercial vessels (though a higher proportion of large purse seine vessels) have VMS on-board and therefore there is no data to compare to the coordinates reported in their logbooks. To address the gap in VMS coverage, BFAR reportedly plans to purchase and install VMS on all 4,000 commercial vessels operating in the Philippines. Vessels above 100 GT operating in the country's EEZ will be prioritized as VMS is already in use by vessels operating in the high seas and PNA waters. The government will also reportedly[6] provide four years of free VMS airtime and intends to strictly enforce the requirement that VMS be turned on at all times.

Issues with the paper documents themselves were also identified. Each FUMR does not have a unique identifying number, so the CSW-DS, CSW-WS, IPRMR, and ultimately the COLD and EU CC do not include KDEs linking them to a specific FUMR. BFAR has been made aware of this issue by USAID Oceans. In addition, for multiple buyers of a single vessel's catch, multiple COLDs are required. However, given the inefficiencies of the current paper system, it is unlikely that BFAR is cross checking the COLDs to confirm there is no double counting of catch.

2.4 eCDTS Design: Opportunities and Challenges

eCDTS will move traceability documentation from paper to digital form. BFAR intends for all staff at port, truck scale, cold storage, and processing to each have their own internet-connected tablet into which they will input the required KDEs at each stage of the supply chain. This should eliminate BFAR's paper filing challenges as well as time-consuming and error-prone manual data verification across different points in the supply chain.

To replace the current paper logbook system, the BFAR Fisheries Information Management Center (FIMC), the department responsible for developing eCDTS, has developed eLogbooks for both commercial and municipal fisheries. However, it is unclear when electronic logbook (eLogbook) will be integrated with eCDTS and where the data goes if not into eCDTS. For smaller vessels using the FAME system (discussed in more detail in the Return on Investment section later in the report), a similar data exchange challenge has been identified as BFAR is not yet able to accept the system's

[4] In an attempt to avoid delays in documentation issuance, one company reported scheduling its landing events to coincide with the duty rotation of BFAR staff that are known to be less stringent when verifying documents.
[6] Based on an interview with an official from BFAR's Licensing and VMS Supervision Division.

vessel location data. However, FAME and BFAR are currently engaging in initial discussions to integrate the systems.

Based on interviews and observations, it appears likely that the most comprehensive fisheries data collection is done by the Port Authority, the government agency responsible for managing port infrastructure. The Port Authority budget depends on fees paid for fish landed and traded at port, so the Authority has a strong incentive to enumerate landings and account for fish entering overland. Data verification for eCDTS would be greatly improved if BFAR catch and export documentation were complemented with data from the Port Authority.

BFAR has elected to host the eCDTS applications and websites on its own local servers. While there are trade-offs between in-house and cloud servers, in-house servers provide the most control over sensitive data and, if managed well, will protect the privacy of sensitive industry data. However, purchasing and maintaining physical servers is expensive and requires substantial information technology capability.

While these issues of data integration and exchange present challenges for BFAR, they also present real opportunities to improve and streamline data validation in the Philippines' tuna fisheries.

2.5 eCDTS Implementation: Opportunities and Challenges

In partnership with USAID Oceans, 13 "First Mover" companies (7 purse seine and handline fishing companies and 6 fresh/frozen and canning processors) volunteered to pilot eCDTS in General Santos City. However, ongoing design issues have kept some companies from using the new system.

Because eCDTS was originally developed based on BAC 251's purse seine KDEs, handline First Movers have reportedly been unable to trial the new system. Similarly, eCDTS still currently requires an FUMR to be issued even though BAC 251-1 no longer requires this document for handline. Many handliners land in areas where there are no BFAR staff onsite for inspection and FUMR issuance for these vessels is not possible.

Another challenge faced in implementing eCDTS has been coordination between BFAR divisions. Some First Mover companies have not yet been able to pilot eCDTS because some registered vessels have not yet been updated in the BFAR database, which is managed by a different BFAR division rather than FIMC. The vessel registration database is used to auto-populate a list of authorized vessels, and eCDTS cannot be used if a vessel does not appear in the database. BFAR is aware of this relatively minor issue and is working to address it.

BFAR plans to make eCDTS data available to designated users via an online application once the system is rolled out nationwide, which has massive potential to improve operations management for fishing and processing companies. Digitized, web-based data will allow fisheries managers to make informed decisions and allow businesses to access their own historic data, potentially streamlining fishing and/or processing operations. This is an important aspect of eCDTS as it could provide concrete benefits to industry and likely increase compliance. There is also an important opportunity to use data from eCDTS for fisheries management, such as improved monitoring of catch and effort. This apparently is a long-term goal of BFAR but is not yet taking place.

As noted above, BAC 251-1 requires a Fish Catch Report for handline vessels in place of the FUMR. While this is a step in the right direction as it introduces some documentation for fish landed outside of ports, it is perceived by small-scale fishers as a challenging additional compliance measure. Though the Fish Catch Report is essentially a simplified logbook, fishers and captains often have low levels of formal education and typically find any paperwork to be burdensome. One way

to ameliorate this issue is to introduce low-cost traceability technology such as FAME, discussed in more detail later in the report.

Data exchange is another potential challenge for eCDTS. To be effective, the system should be able to accept data from not just vessel tracking technology and at-sea catch reporting systems (e.g. VMS and FAME), but from other supply chain actors such as transportation and processing companies' internal traceability systems as well as new technologies that are introduced in the future. It is recommended that BFAR create a process for accrediting technology providers to be interoperable with eCDTS and remove any political barriers to data exchange.

Finally, eCDTS currently excludes municipal vessels, a significant portion of the fisheries sector in the Philippines. An LGU traceability document is reportedly under development by BFAR, and BFAR is planning to authorize LGUs to validate municipal catch and share data using eCDTS.

2.6 Identified Improvements to BAC 251-1

While the update to BAC 251-1 streamlines the catch documentation process for handline fisheries, stakeholders noted some additional changes that would further ameliorate traceability compliance. One key issue that the BAC 251-1 update has not addressed is the requirement for so many KDEs that are not relevant to traceability, such as the temperature of the cold storage room. Similarly, BFAR currently requires one EU CC per vessel, sometimes resulting in numerous catch certificates per consignment. However, this is not required by many high-value export markets (e.g., the EU), and a further update 251-1 could address this issue. Given the onerous documentation requirements outlined above, industry has understandably pushed back against providing so many data points.

Currently, BAC 251-1 does not advise the use of technology to collect KDEs. The eCDTS allows for a fundamental reshaping of how traceability is documented, but BAC 251-1 still simply lists the KDEs that each traceability document must include. The new regulation could also lay out a path for accrediting hardware providers and enabling data exchange.

2.7 SIMP Compliance: The Philippines

US SIMP requirements differ from those in for the EU. Unlike EU import regulations, which focus on government-to-government exchange, SIMP was designed as a business-to-business set of requirements. The key benefit to this approach is that regardless of the exporting government's ability to issue export documentation in a timely manner, if supply chain actors can properly document traceability for their products internally, this is sufficient for access to the US market.

For US-bound consignments, just two traceability documents are required for catch from vessels above 20 GT: a NOAA 370 form[7] (Captain's statement/dolphin safe) and a catch certificate documenting source vessel name, registration/license, catch area, gear type, landing port, species, weight, and product. For catch vessels below 20 GT, a simplified catch certificate and aggregate list of vessels is sufficient. For vessels below 20 GT a captain's statement is not required, and fish are not required to be traceable back to individual vessels. The combination of self-reporting and aggregate vessel reporting presents a risk of data inaccuracy or even fraud. Therefore, capacity development efforts should focus on small-scale fisheries, including traders.

In practice, documentation for SIMP is much easier to secure, though for small commercial vessels it can reportedly take up to a week to receive a captain's statement. Some companies reportedly

[7] https://www.fisheries.noaa.gov/national/marine-mammal-protection/noaa-form-370-fisheries-certificate-origin

have purchase agreements with vessels stating that if captain's statements are not provided then payment will not be made. The NOAA 370 form is not required for fresh consignments.[8]

For the companies interviewed, US SIMP compliance is by all accounts simple and easy compared to the onerous requirements associated with obtaining EU CCs. These companies have all exported to the EU and US for many years and are accustomed to keeping detailed traceability documentation. The primary difference between US- and EU-bound consignments from the Philippines in terms of traceability is the volume of paperwork going back and forth between industry and BFAR.

If BFAR oversight were more comprehensive, the difference in traceability would be substantial because BFAR would provide legitimate third-party verification of catch volumes and flows through the supply chain. However, current practice does not meet this standard, so there is little difference between EU and US traceability in practice. In both cases, industry self-reports and figures are later cross-checked by BFAR or a NOAA auditor; accuracy of this verification process is questionable.

Once eCDTS is fully implemented, however, the level of effort required to secure an EU CC should be greatly reduced once the required documentation process can be conducted online. However, it appears that as currently designed, automatic data comparison will not be a feature included in eCDTS. While digitization will address BFAR's file storage challenges, manual data comparison is still subject to delays and human error. A design solution to this would be to enhance the eCDTS with a feature that allows algorithmic data comparison of digital documents (e.g. VMS data compared to logbook or cold storage deposit/withdrawal/in-plant monitoring data). This would also allow for automatic issuance of FUMR and COLD documentation. Not only would this greatly expedite the traceability documentation process, it would improve the quality of oversight by avoiding human error and would allow for COLDs to be cross compared if a single landing were sold to multiple buyers.

Once implemented, the eCDTS should allow for improved government oversight of exports to the US and other countries that do not require any traceability documentation. While business-to-business documentation will not change for US SIMP, the underlying government documents such as FUMR and COLD are more likely to be issued as required by BFAR regulations. However, real traceability improvement will rely on BFAR's ability to refocus its efforts from verification of industry-reported data to first-hand verification at port.

[8] https://www.fisheries.noaa.gov/national/marine-mammal-protection/noaa-form-370-fisheries-certificate-origin

3. KDE COMPLIANCE AND eCDT SYSTEM IMPLEMENTATION: INDONESIA

MMAF, with assistance from USAID Oceans, launched an electronic logbook, or "eLogbook" application in late 2018 that is currently being piloted across the country. This system was the subject of the first Indonesia One-by-One Tuna Alliance case study, "eLogbook Implementation: Benefits, Industry Perception, and Opportunities." This second case study considers the current regulatory environment for both paper logbooks and eLogbooks.

In addition to the eLogbook, MMAF has prototyped an online traceability and logistics system called STELINA (Sistem Telusur dan Logistik Ikan Nasional, or "National Fish Search and Logistics System") (see section 3.2). This report outlines the challenges and opportunities associated with its potential implementation. Though conceptually similar to eCDTS in the Philippines, the STELINA system faces a more complex environment as Indonesian landing sites are more numerous and dispersed, and Indonesia's fisheries regulatory regime and bureaucracy are more complicated.

Data in Indonesia was gathered through semi-structured interviews with officials from the following organizations:

Figure 2. Interview subjects in Indonesia

Bitung	# of participants	Jakarta	# of participants
USAID Oceans	1	USAID Oceans	1
Bitung Port	2	MMAF eLogbook team (DG Capture Fisheries)	5
Provincial MMAF	2	MMAF STELINA team (DG Product Competitiveness)	3
Fishing and processing/ exporting companies (9)	18	MDPI	2

3.1 eLogbooks: Current Regulatory Environment

In 2014, the MMAF Minister issued the "Capture Fisheries Logbook" regulation requiring the submission of paper logbooks for vessels above 5 GT. [9] This specifies logbook formats and KDE entry for three gear/vessel types:

1. Handline and longline tuna
2. Purse seine (targeting large pelagics), pole and line (both mechanical and manual), and troll
3. Other gear types

In 2018, the MMAF Directorate General (DG) of Capture Fisheries issued a second regulation, "Technical Guide for Capture Fisheries Logbook Implementation". [10] As this regulation was issued by a DG rather than the Minister, it has less power compared to the 2014 regulation and is explicitly intended to supplement the original. Apart from providing more detail on paper logbook data entry and submission, this regulation now requires vessels above 30 GT to use eLogbooks (effective November 1, 2018) while continuing to require vessels between 5 and 30 GT to use paper logbooks.

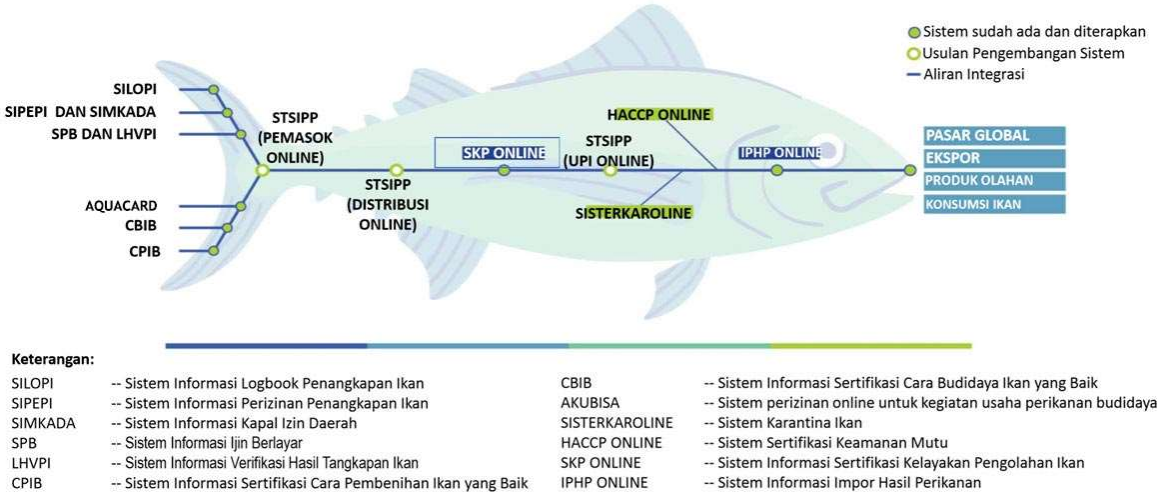
[9] NOMOR 48/PERMEN-KP/2014, which superseded the previous logbook regulation, PER.18/MEN/2010.
[10] NOMOR 11/PER-DJPT/2018.

In certain areas, including Bitung, the Port Authority has implemented an informal "requirement" for vessels between 10 and 30 GT to submit eLogbooks in lieu of the obligatory paper logbooks. This informal requirement is not technically enforceable as it has no legal basis. However, the Port Authority may grant access to subsidy programs for fishers that regularly submit eLogbooks. MMAF supports these informal regulations as they encourage the increased adoption of eLogbooks. For vessels below 30 GT that follow the Port Authority's informal regulation and submit eLogbooks, they are technically in violation of current MMAF regulation. While in practice these vessels are almost certain to avoid sanction as they technically exceed the requirements, they are in fact in conflict with the letter of the law.

3.2 STELINA: Overview

First devised in 2017 based on a traceability system used in governing the Indonesian logging industry, the prototype has been developed by the Director General (DG) of Product Competitiveness within MMAF with support from USAID Oceans. STELINA is the digital backbone for an integrated, export-focused traceability, logistics, and quality assurance system. The system is intended to integrate data from at least 12 disparate government data systems, including vessel registration and licensing, eLogbooks, port verification, Hazard Analysis and Critical Control Points (HACCP), and quarantine, providing improved and more timely visibility of seafood, both wild capture and aquaculture, moving through the supply chain.

Figure 3. Proposed STELINA framework



Keterangan:

SILOPI	-- Sistem Informasi Logbook Penangkapan Ikan	CBIB	-- Sistem Informasi Sertifikasi Cara Budidaya Ikan yang Baik
SIPEPI	-- Sistem Informasi Perizinan Penangkapan Ikan	AKUBISA	-- Sistem perizinan online untuk kegiatan usaha perikanan budidaya
SIMKADA	-- Sistem Informasi Kapal Izin Daerah	SISTERKAROLINE	-- Sistem Karantina Ikan
SPB	-- Sistem Informasi Ijin Berlayar	HACCP ONLINE	-- Sistem Sertifikasi Keamanan Mutu
LHVPI	-- Sistem Informasi Verifikasi Hasil Tangkapan Ikan	SKP ONLINE	-- Sistem Informasi Sertifikasi Kelayakan Pengolahan Ikan
CPIB	-- Sistem Informasi Sertifikasi Cara Pembenihan Ikan yang Baik	IPHP ONLINE	-- Sistem Informasi Impor Hasil Perikanan

Source: http://dev.sci.web.id/stelina/

Apart from integrating data collected by other online systems, STELINA is intended to increase data collection from traders that operate between vessels and processing companies, filling a key traceability and verification gap.

MMAF intends to introduce a STELINA mobile application for traders and legally require them to input KDEs such as date, location, species, weight, and vessel license data (which links to gear and vessel size) for the seafood they purchase and resell.[11] For capture fisheries, fish sourced from vessels above 10 GT will receive a unique identifying number (hereafter referred to as a "STELINA

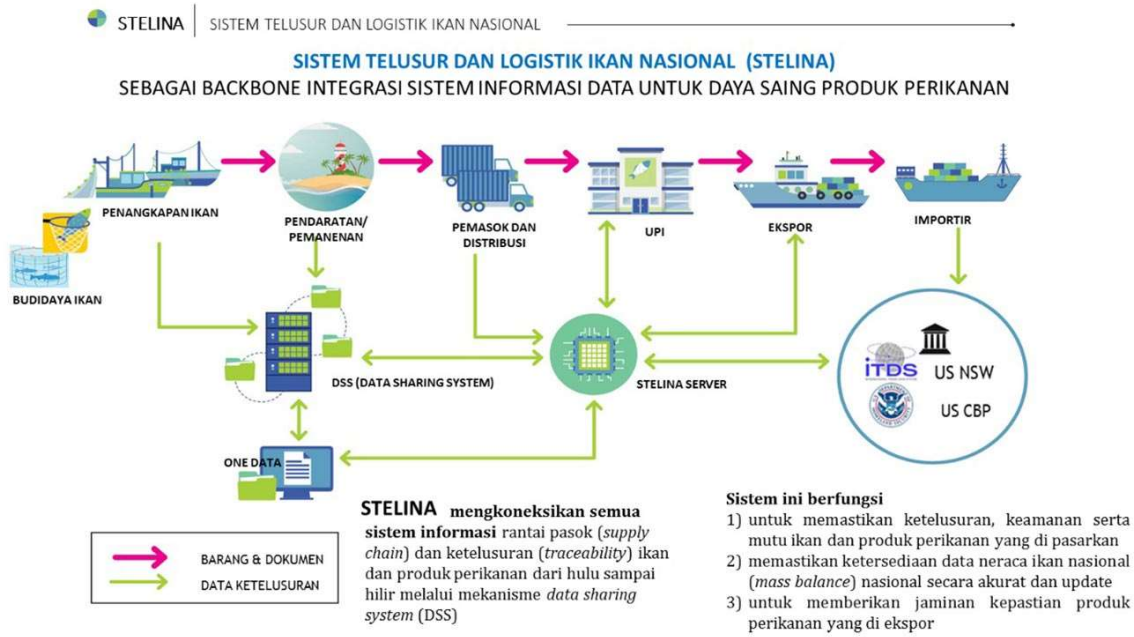
[11] MMAF reports that smartphone penetration among traders is close to 100 percent. However, as many traders operate in remote areas with poor network connectivity, STELINA will be designed to allow offline use, with data transmitted once the user is in network range.

number") per trader per day. In other words, if a vessel above 10 GT lands fish and sells to three traders on a given day, three STELINA numbers will be generated. Vessels below 10 GT can be aggregated, with each trader receiving one STELINA number per day. A single STELINA number may include multiple species, but initially the system will focus on only the following fisheries: tuna, snapper, grouper, blue swimming crab, shrimp, and abalone.

Once the fish is sold and sent to the processor, the trader will be able send a message (or attached QR code) to the processor including the STELINA number(s) comprising the shipment. This will provide traceability to the processor from trader/vessel and can help the processor verify if there has been any loss along the way. Meanwhile traders could use the STELINA application to monitor their price and earnings history.

Processors sourcing catch directly from vessels would be responsible for entering these data into the STELINA system via online website rather than mobile application. In addition, processors and exporters will be required to enter product information including species, tonnage, product type (e.g. frozen loins, canned product, etc.), export country, and buyer name for their exports.

Figure 4. Proposed STELINA reporting mechanism



Source: http://dev.sci.web.id/stelina/

Data entered into STELINA will be secured internally within MMAF's "One Data" (PUSDATIN) system, which, as its name suggests, is the repository for all ministry data and IT systems. The data generated by STELINA is intended to inform the ministry's data reporting, but data exchange has yet to be fully developed.

3.3 STELINA: Practical Considerations

As currently designed, STELINA will rely in large part on the willingness and ability of traders to enter correct and complete data. This is a major barrier as these supply chain actors are in effect being asked to shoulder much of the additional work required to make the system function. In order to incentivize compliance, MMAF intends to draft and introduce a regulation to require use of the system by all traders and processors/exporters buying and selling in-scope fish species. While this can be a powerful incentive for traders in some places such as major ports, enforcement will be

especially difficult in remote areas where a large proportion of fish is caught. Therefore, to increase compliance, MMAF has an agreement with the state-owned Bank Rakyat Indonesia (BRI, or "People's Bank of Indonesia") to offer collateral-free loans to traders that use STELINA.

3.4 STELINA: Barriers to Implementation

To be implemented as it is currently designed, STELINA must overcome significant barriers. There are reportedly multiple online systems administered by other MMAF DGs, and even other ministries, that still require data sharing agreements for STELINA to function as designed. While it is still relatively early in the development process, data from these other key systems cannot be integrated without official agreements, which can be a time consuming and highly political process.

On the regulatory front, current authorization for the system is based on DG decree and has not yet been formalized with a ministerial regulation. There is currently no timeline for the regulation to be put in place, but this likely depends on the ability to secure data sharing agreements. The drivers of STELINA estimate it could be five years before the system is fully developed and deployed.

3.5 STELINA: Opportunities

Despite the challenges above, STELINA could revolutionize CDT in Indonesia. It could improve overall traceability by better linking fish processing to catch. Under the government's current export documentation protocol, EU CCs are linked to logbooks, but when vessels sell to multiple traders and processors there is no verification if the amounts claimed to have been sourced from vessels matches the catch reported on their logbook. This is a significant gap in the current traceability system that STELINA would help to ameliorate.

In addition, capturing trading data would provide more visibility into fisheries supply chains. Research from multiple Indonesian ports confirms that port authorities and local MMAF offices do not have a clear picture of the number of fish traders operating or the amounts of fish being traded. In some supply chains fish are traded or processed multiple times before being exported. Data from fish traders and processors will also allow for a better understanding of local consumption of seafood and contributions to food security.

In order to input trade data into the system and receive a STELINA number, traders will be required to select the vessel(s) they have sourced from by choosing from a pre-populated list linked to vessel registration and licensing data. Each STELINA number could be linked to an eLogbook verification number, assuming eLogbooks are integrated into the system once they are fully deployed. While data from STELINA, like eLogbooks, is self-reported, it would provide the ability to compare data from fishers and traders, which though not fool proof, can act as a key form of verification.

A case study on eLogbooks conducted in 2019 by the Indonesia One-by-One Tuna Alliance and USAID Oceans noted that "by simplifying, digitizing, and integrating the catch and export documentation process while simultaneously implementing eLogbooks, both MMAF and industry actors can increase efficiency." In essence, this is what STELINA could do. The potential to compare and verify license, catch (eLogbook,) and trade (STELINA) data, along with automated mass balance capabilities, could provide MMAF with the ability to move the entire catch and export traceability and documentation process online. This would be a significant advancement in Indonesia's export documentation. Not only would this cover export documentation requirements for EU CC and US SIMP, it would introduce traceability and increase visibility into all export markets. Data quality, validation, and exchange, though imperfect, would likely be much improved and much less labor intensive compared to the status quo.

In fact, if MMAF required processing companies to provide STELINA data in order to export seafood products, this might prove to be the best way to ensure the traders' compliance with international export regulations. Significantly changing the behavior of geographically dispersed traders with regulatory and credit incentives alone will be very difficult in practice. However, if processors are unable to legally export without STELINA data, they will push hard on their suppliers/traders to provide these data. It is currently unclear whether the EU CC system will be integrated with STELINA initially. However, this may not matter in the long term as processors will push MMAF to recognize that their compliance with STELINA already fulfills the EU CC requirements.

When STELINA is fully developed and rolled out, it is recommended that all users receive unique identifiers. This will allow traders to indicate the buyers of their products and increase automation in the system. All data comparison should be automatic and remove the need for human oversight to the greatest extent possible.

3.6 SIMP Compliance: Indonesia

In many ways, current compliance with SIMP requirements in Indonesia is very similar to that in the Philippines. Many companies have experience exporting to both the EU and US for multiple years, so there is an institutional understanding of traceability documentation and little issue complying with SIMP requirements. The SIMP requirements and procedures are identical in both countries and processing/export companies do not report any challenges or shortcomings related to KDE collection and sharing from their suppliers, whether they are larger fishing companies or traders. For processing/export companies sourcing from vessel below 20 GT, there also are reportedly no issues with collecting the requisite KDEs. As vessel lists can be aggregated in SIMP for vessels under 20 GT, there is a risk of data inaccuracy or even fraud. In both countries, the current government documentation requirements are much more onerous, time consuming, and difficult to secure than those for SIMP, but not necessarily any more rigorous. As in the Philippines, actual data verification, such as port enumeration, by the Indonesian government is highly inconsistent and self-reporting is the norm.

Some Indonesian exporters are required by their US-based buyers to have their SIMP catch forms stamped and signed by the local competent authority. In order to secure this signature, the companies must go through the full government documentation process, making it equivalent to securing an EU CC. Some large cannery companies in both Indonesia and the Philippines reported making the extra effort to secure government traceability documentation even when it is not required by the buyer or the importing country's government. There are two stated reasons for going through this extra effort. The first is that the canning companies sometimes do not know what country a consignment will be sent to, so they provide the additional documentation as a precaution. The second reason is that it's done as a safeguard in case of a NOAA audit. A third unstated though possible reason for this practice is that these companies already have the compliance staff on hand, so it's just become a standard procedure without additional cost.

Because of the reliance on self-reporting, there is a risk of data inaccuracy or even fraud, with the potential for IUU fish to enter supply chains. This risk is highest when sourcing from small traders or vessels for which data requirements are less strict. When preparing for a potential NOAA audit, companies should have port clearance, receiving documents, and logbooks (paper or electronic) readily available. For both the Philippines and Indonesia, the implementation of their respective eCDT systems will reinforce future compliance with SIMP requirements and audits.

4. RETURN ON INVESTMENT FOR TRACEABILITY TECHNOLOGY IMPLEMENTATION

The final portion of the study focused on quantifying the returns on investment (ROI) for select traceability technologies currently in use in the Philippines and Indonesia—FAME, Pointrek, Tally, and TraceTales.

4.1 FAME

FAME is a low-cost vessel tracking system that transmits encrypted vessel GPS coordinates via radio frequency using terrestrial rather than satellite-based communications. In addition to real-time vessel tracking and SMS capabilities via mobile application, the technology allows for digital tagging of individual fish. This is achieved by tapping an NFC card or band on an on-board transponder at the time of catch, which automatically logs the vessel registration/license data, plus date, time, and GPS coordinates of the catch.[12] The NFC card or band is then attached to the tail of the fish (yellowfin/bigeye tuna) and landed with the fish. The tag data can be extracted at port by the trader/buyer with the appropriate hardware and provides the same KDEs as an eLogbook, eliminating the need for paper documentation. The system could greatly assist small-scale fishers to comply with the Fish Catch Report requirement under BAC 251-1.

For fishers that have smartphones, a proprietary application can be used to send text messages to other users on land or at sea. For those without smartphones, FAME is launching a new version of its system with an integrated touchscreen so that fishers can send messages from the vessel and see their position data. Transponders can currently transmit from 50-100 kilometers from shore based on weather conditions. However, as more users adopt the system the range will be extended because the transponder themselves function as signal repeaters.

Under USAID Oceans, the FAME system was piloted on 30 handline vessels in General Santos City, Philippines between 2018 and 2020. The hardware costs are PHP 3,600 (US$ 72) for the transponder and an additional PHP 3,000 (US$ 60) for the NFC reader/writer. Airtime packages cost PHP 800 (US$ 16) per month for vessel tracking and PHP 100 (US$ 2) per month for 100 text messages.[13] NFC cards cost PHP 200 (US$ 4) each but are reusable with an estimated 3-year lifespan, while single-use NFC bands will cost approximately PHP 12-25 (US$ 0.25-0.50) each.

Costs for the various components of FAME technology are detailed in Figure 5.

Figure 5. Costs associated with FAME technology

Hardware/software	Cost (PHP)	Cost (USD)
Transponder	3,600	72
NFC reader/writer	3,000	60
Airtime per month: vessel tracking	800	16
Airtime per month: 100 text messages	100	2
NFC card (multi-use)	200	4
NFC band (single use)	12-25	0.25-0.50

[12] The technology is currently designed for the handline yellowfin tuna fishery data defaults are for gear and species are set accordingly.
[13] Figures are based on the time of the site visit, (Month, 2019). At the time of reporting, pricing was not yet available for the integrated touchscreen.

A private handline tuna fishing company in Palawan has also independently implemented FAME technology on its vessels on a voluntary basis and has devised an incentive program to encourage adoption. The company reported that decided to use FAME because it seeks to improve livelihoods in the small-scale fisheries from which it sources and values traceability as a marketing and branding tool. For company vessels that agree to install the FAME hardware, the company pays an additional PHP 100 (US$ 2) per adult yellowfin tuna that has an NFC tail tag attached. For fishers to recoup the monthly airtime cost, they need only to catch and tag nine fish per month. Based on the subsidy of PHP100 per card, a fisher only needs to catch ten tagged tunas to cover the FAME monthly subscription fee. (Note: this fishery is not active year-round, so FAME only charges for its services during the fishing season.)

Because FAME is only in the pilot stage, potential financial benefits of the technology have not yet been realized. Therefore, it is not yet possible to quantifying the ROI for this technology. Instead, the research team explored potential *future* returns on an investment from FAME.

FAME has potential compliance benefits related to the automatic completion of eLogbooks and the ability to secure a Fish Catch Report as newly required under BAC 251-1. Vertically integrated companies that own both handline fishing vessels and fresh/frozen processing facilities reported difficulties securing paper logbooks from vessel captains. Considering that these captains are company employees, it likely that there would be additional challenges convincing independent captains and fishers to complete paper logbooks.[14] One First Mover company currently employs two full-time compliance staff to compile vessel registration data and interview fishers and vessel captains for the purpose of filling in logbooks for small-scale fishers.

Assuming these compliance employees could be reassigned to a different role in the company after FAME is installed on the company's 46 vessels, the ROI[15] for the compliance efficiencies associated with FAME would be very high, approximately 45 percent over three years, with a payback period of 19 months. Note that this figure is tentative as it is unclear whether one or both compliance employees could be reassigned if FAME were implemented, and the ROI would be negative if only one employee were reassigned.

FAME also offers potential business benefits. The vast majority of vessels operating around General Santos City are reportedly already equipped with radio and GPS, so communications, safety-at-sea, and positioning are not strong selling points to small-scale captains and fishers. Though FAME has a greater range than radios, fishers surveyed indicated unanimously that they would not be willing to pay for FAME only to have access to the communications, safety, and positioning features.

Most handline vessels fishing in the areas around General Santos City are not owner-operated, so the case could be made to owners that the ability to track their vessels' whereabouts in real time is attractive. First, there is the convenience and peace of mind of being able to see the location of the fleet on demand. Second, it is reportedly common for vessel captains and crew to illicitly sell fuel to boost their incomes at the owner's expense. Vessel owners said they were certain that this takes place but did not know how often it happens or how much fuel they are losing due to this practice. With vessel tracking data, owners could estimate fuel usage and discover if fuel were being pilfered.[16]

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[14] Securing captain's statements relatively easy as it only requires a signature.
[15] All ROI figures cited in the report are calculated as an internal rate of return (IRR). Based on interviews with SOCKSARGEN, this calculation assumes a monthly cost of PHP 30,000 (US $600) for compliance personnel.
[16] It was also theorized that FAME could allow vessel owners to prevent illicit sales of fish at sea, but upon further investigation this was found not to be true. These illicit activities would not be detected by tracking movement at sea.

While peace of mind is unquantifiable, it is possible to estimate the level of fuel loss mitigation at which FAME would achieve a positive ROI, assuming that buyers will not be willing to pay for traceability data. Assuming[17] a price per liter of PHP 60 (US $1.20), 180 liters of fuel per trip on average for a 10-day trip, and an average of two to three trips per month, a fuel savings of approximately 15 to 20 percent would be required to recoup the cost of FAME with full NFC tagging capabilities. Though vessel owners aren't able to estimate fuel losses, this level of fuel savings is quite high and therefore unlikely. Thus, this datapoint is also unlikely to convince owners to invest in the technology. On the other hand, a vessel using a FAME system without NFC tagging capabilities would require fuel savings of just 3 to 4 percent for the technology to break even. This is a clear case that could be made to vessel owners.

Though the system is not yet fully functional or integrated with eCDTS, FAME could greatly improve data collection in General Santos City and beyond. Based on conversations with multiple stakeholders including both fishers, traders, and exporters, FAME's current price point is within reach for many vessel owners, as radios reportedly cost approximately US $840 and GPS units approximately US $350 (compared to US $132 for FAME hardware). To date, two companies have been willing to test FAME in their supply chains without external funding support. Moving forward, it will be critical to prove the technology's value in the field and address any pain points for fishers and captains using the system. Socialization of other supply chain actors will also be a critical component of adoption. When the NFC tags appeared at General Santos Port 1 at the beginning of the pilot, none of the buyers knew what they were; they were simply thrown away and were lost.[18]

Finally, the ROI analysis highlights that a significant portion FAME's cost is associated with NFC reading/writing and fish tagging capabilities. The upfront capital cost of the card reader (PHP 3,000 or US $60) is nearly equal to the cost of the transponder (PHP 3,600 or US $72), and the cost of the disposable NFC bands is particularly high. Assuming a cost per band of PHP 20, six fish per vessel per day, fishing every day,[19] the cost per month of just the bands is PHP 3,600—the same as the transponder. It will be important to bring the cost of the NFC tags and bands down in order to drive adoption of the technology.

4.2 Pointrek

Pointrek is a two-way communication VMS marketed in Indonesia by PT Sisfo. This low-cost system provides mobile and desktop applications that allow vessel owners to track the position and heading of their fleets in real time and communicate via an integrated SMS application.[20] The cost of the system is approximately US $1,450 for hardware[21] and the first year of airtime and US $540 per additional year of airtime (or US $45 per month).

With support from USAID Oceans, the system is currently in use in the supply chain of a vertically integrated handline fishing and fresh/frozen processing company based in Bitung. During interviews, company representatives expressed great satisfaction with Pointrek. Based on its positive experience with an initial five on-board units subsidized by USAID Oceans, the company has purchased another eight units with its own funds. Though their vessels are already equipped with GPS and radios, the owner of the company perceives the technology as value for money. The chief benefits cited were peace of mind and detailed operational monitoring due to the on-demand

[17] Based on interviews with vessel owners.
[18] It is unknown whether anyone was assigned to receive the NFC tags at port.
[19] These assumptions are based on interviews with fishers and fish traders and exporters.
[20] Both Pointrek and FAME systems can be integrated with onboard sensors, enabling on-demand monitoring of key metrics related to cold storage and engine performance. However, no interviewees had experience with these features.
[21] VMS hardware refers to an on-board box with a built-in touchscreen display, antenna, and power supply.

accessibility of the position, heading, and fish inventory of all linked vessels. Other benefits sited were the ability to communicate privately via the messaging application. For handline captains especially, catchment areas are trade secrets; even if the vessel owner wants to know the current area of operation, the captain might be reluctant to broadcast location information over the radio due concerns that other fishers will hear the broadcast and fish in that area, depleting resources and potential profit. The company owner also stated that at-sea reporting technology like Pointrek will improve customer trust in the provenance of the data.

The estimated quantifiable benefits of the technology are as follows:

1. Fuel and supply savings of approximately 10 percent and 2 percent respectively based on the shorter trips due to better navigation as a result of increased oversight of captains' at-sea operations.
2. Approximate 2 percent increase in catch quality due to coordinated efforts and shorter trips.
3. Labor savings associated with communication and administrative efficiencies of approximately IDR 840,000 (US $60) per month (i.e. radio operator and port-in/landing administrative staff can be reassigned within the company).

Based on these estimated savings, over three years, investing in Pointrek is estimated in 5 years to generate an internal return rate (IRR) of 482 percent[22] with a payback period of 3.2 months. (Detailed return calculation can be found in Annex I.)

A second, much larger vertically integrated company[23] received two subsidized Pointrek units from USAID Oceans. In contrast to the first company, the second is ambivalent about the benefits of Pointrek. This company and its captains are comfortable communicating via radio and only rely on satellite communications if radio is unavailable due to bad weather. This company did not report any cost savings and did not appear to value the ability to access the position of its vessels on demand. This could be due to the fact that the company is much larger than the first company. As a large company, risk is spread over a larger number and different types of vessels, and managers do not have the capacity—or perhaps even see the need—to manage the fleet any more closely than they do currently. As such, the company does not appear to perceive a positive ROI for Pointrek, and therefore is unlikely to invest additional finances on the technology going forward.

4.3 TraceTales

TraceTales, developed and implemented by MDPI, is a software that digitizes paper traceability for processing companies. TraceTales is only available for fresh/frozen processing operations producing yellowfin tuna products (e.g., loins) but will soon be available for finished goods such as steaks, saku, and cubes. Nearly all TraceTales installations at the time of the report have been subsidized by USAID Oceans and other funders. For private transactions, users of the system will be charged an annual licensing fee based on the number of stations inside their processing facility, and the pricing level has not yet been finalized.

The cost of the system varies based on the size of the operation, but for the purposes of this study, researchers explored ROI for the same fresh/frozen tuna catching and processing company in Bitung that reported very positive results with Pointrek. Total installation and hardware costs at

[22] ROI calculation is a forward-looking metric based on the intuition of the business owner rather than historical results. Best efforts were made to capture values, but documentation is currently limited and is expected to improve as the technology is more widely implemented.
[23] The company owns numerous fishing vessels of different gear types and operates a cannery and frozen processing facility.

this company totaled IDR 288 million (US $20,000), with an additional US $15,000 in annual licensing fees. The estimated quantifiable benefits of the technology include 30 percent labor savings associated with internal tallying/traceability processes (23 employees) and annual savings of 40 person-days associated with customer audits. Based on these estimated savings, over a five-year period, investment in TraceTales is estimated to generate an IRR of 53 percent[24] with a payback period of 11.4 months. (Detailed return calculation can be found in Annex I.)

The cost of the system varies based on the size of the operation, but for the purposes of this study, researchers explored ROI for the same fresh/frozen tuna catching and processing company in Bitung that reported very positive results with Pointrek. Total installation and hardware costs at this company totaled IDR 288 million (US $20,000), with an additional US $13,500 in annual licensing fees. The estimated quantifiable benefits of the technology include 30 percent labor savings associated with internal tallying/traceability processes (23 employees) and annual savings of 40 person-days associated with customer audits. Based on these estimated savings, over a three-year period, investment in TraceTales is estimated to generate an ROI of 17 percent[25] with a payback period of 16.9 months. (Detailed return calculation can be found in Annex I.)

The technology's qualitative benefits (as perceived by the owner of the company) are market access and strengthened relationships with buyers. At the same time, this business owner reported that it is not clear whether buyers really care whether such technology is in place in their suppliers' facilities and noted that data captured through TraceTales doesn't carry as much importance as health regulations such as HACCP and British Retail Consortium (BRC) standards. Instead, the owner reported that having TraceTales is in large part a marketing tool signifying that the company is a bona fide, high-quality seller. The owner stated that TraceTales was desirable because it has the potential to provide market access to Japanese buyers that are widely known in the industry to source very high-quality product.

Other benefits reported by company representatives as a result of improved information management through TraceTales were:

1. Increased ease tracking inventories and operational process flow.
2. Reduced risk of tax non-compliance penalties due to quantitative improvements resulting from data that is more accurate, available quickly, and readily transferable via electronic.
3. Improved intelligence with regards to business and operations management.
4. Increased compliance with regulatory and market requirements, including SIMP, EU CC, and Marine Stewardship Council (MSC) certification.

Other potential benefits reported for enterprise resource planning systems similar to TraceTales include improved forecasting ability, information integration across different business sectors, customized reports, improved customer service, and more reliable data.[26]

[24] ROI calculation is a forward-looking metric based on the intuition of the business owner rather than historical results. Best efforts were made to capture values, but documentation is currently limited and is expected to improve as the technology is more widely implemented.
[25] ROI calculation is a forward-looking metric based on the intuition of the business owner rather than historical results. Best efforts were made to capture values, but documentation is currently limited and is expected to improve as the technology is more widely implemented.
[26] https://www.workwisellc.com/blog/15-benefits-implementing-erp-software/

5. CONCLUSION

For the governments of the Philippines and Indonesia, the benefits of implementing eCDT systems are clear. If implemented as designed, these systems will improve data collection and traceability in their export fisheries' supply chains.

In the Philippines, if implemented effectively and as designed, the country's eCDT system has the potential to significantly streamline KDE verification and export documentation process. The system can allow BFAR to focus its efforts on improving oversight and verification of catch and traceability across the supply chain. This study found regulatory and design improvements to the system, including coordination between BFAR divisions and data exchange challenges.

In Indonesia, if MMAF is able to overcome the significant administrative hurdles to implementing its prototype eCDT system, STELINA, the quality of Indonesia's fishery data and supply chain traceability would greatly improve and ultimately simplify the export documentation process. This study found significant barriers to STELINA's implementation, including coordinating and data sharing across MMAF DGs and formalizing the system's authorization with a ministerial regulation.

Regarding the ROI for private sector eCDT investments, these benefits are currently difficult to quantify given the lack of data due to the presently low user base. For traceability systems such as TraceTales being used by processing companies, the quantifiable ROI appears to be based on efficiencies in administrative paperwork associated with data inputs and auditing. Based on the expectations of a company installing TraceTales, the estimated quantifiable ROI for the technology is approximately 17 percent. Going forward, as more companies adopt the technology, it is expected that quantifying an ROI will be more straightforward.

The ROI of Pointrek, a 2-way VMS technology with catch reporting capability, benefits can also be estimated. Based on savings on fuel, labor, and trip expenses, as well as a perceived increase in quality, the estimated quantifiable ROI for the technology is approximately 130 percent. With an estimated payback period of approximately 8 months, a company that has a fleet of fishing vessels should consider implementing the system.

For another vessel tracking technology, FAME, the potential ROI is still unclear as the system has yet to be proven in the field. In General Santos, where the technology has been piloted, GPS and especially radios are already widely used, perhaps limiting the current willingness to pay for FAME among some stakeholders in this fishery. However, the price of the system is sufficiently low and the perceived (though unquantifiable) benefits of real-time vessel tracking sufficiently high to arouse substantial interest. Operational benefits aside, the Philippines under BAC 251-1 is implementing a new requirement for small-scale fishers to produce simplified logbooks in order for their catch to be exported. As these fishers often find completing paper logbooks to be difficult, FAME may be their best option to comply with the new regulation. For vertically integrated processors, there may be a positive ROI associated with FAME as it could save them the costs associated with filling out paper logbooks on behalf of their vessel captains. Similarly, for vessel owners, potential fuel savings associated with reduced pilfering may result in a positive ROI.

For any traceability technology to enjoy widespread usage in the absence of a regulatory requirement or subsidy, it is likely that its business benefits must be significant and unambiguous. Though context-specific, each of the three technologies described in this report appears to meet these criteria.

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ANNEX I: DETAILED ROI CALCULATIONS

Figure 6. ROI Calculation for Pointrek

	USD	IDR	
CAPEX (Pointrek device) including airtime	1650	22,820,000	
Airtime annual fee after first year	540	7,700,000	
Savings / Benefits per trip	**Rate**	**Estimated Based Cost (IDR)**	**Total Benefit**
Vessel with 20-24 GT			
Fuel per trip (3,5 ton @ IDR 5200 / liter subsidized price)	10%	18,200,000	1,820,000
Supplies per trip	2%	12,000,000	240,000
Increased value Catch per trip (2,500 Kgs @ IDR50,000/kg)	1%	125,000,000	2,500,000
Saving in Port-in and landing admin (man/day)	2	140,000	280,000
Saving Radio operator per trip	1		140,000
Saving / benefit per trip			4,980,000
Number of trips per year*	24		
Saving per year			**119,520,000.00**

Year	**Net Annual Cash Saving (IDR)**
Year 1 (After Capex 22,820,000)	86,740,000
Year 2	76,876,000
Year 3	76,876,000
Year 4	76,876,000
Year 5	76,876,000
IRR (5 years)	**482%**
NPV (5 years) at 12%	378,248,217
Payback Period	**2.3** Months

* Using very conservative calculation, trip length is between 10-14 days. Some boats do 2 trips in a month.

Figure 7. ROI Calculation for TraceTales

	USD	IDR		
Capex hardware	$17,300	242,000,000		
Capex installation	$2,700	37,800,000		
Licensing fee after first year	$15,000	210,000,000		
Monthly Savings				
Labor cost related to data input	23	4,000,000	30%	27,600,000
Customer audit support 4 days a year 10 staff stand by	10	160,000	4	533,333
Total Monthly savings		**28,133,333**		

Year		Net Annual Cash Saving (IDR)
Year 1 after Capex		15,400,000
Year 2		85,400,000
Year 3		85,400,000
Year 4		85,400,000
Year 5		85,400,000
IRR		**53%**
NPV (5 years) at 12%		215,347,887.68
Payback Period		**11.4 Months**