DESIGN AND IMPLEMENTATION OF INNOVATIVE SOLUTIONS FOR SMART SATELLITE TECHNOLOGY TO PROMOTE INCLUSIVE AND SUSTAINABLE FISHING PRACTICES IN INDONESIA

PART OF THE UKSA INTERNATIONAL PARTNERSHIP PROGRAMME (IPP)

Endline Impact Assessment (<30 GT)

DELIVERABLE DI330.7

02 September 2019

POSEIDON
AQUATIC RESOURCE MANAGEMENT

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Report Information

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Acronyms used

AIS..... Automatic Identification System

BA-HPK..... Official Report for Departure Inspection of Fishing Vessel

BASARDA ..... *Badan SAR Nasional* (National Search & Rescue Agency)

BKPM ..... *Badan Koordinasi Penanaman Modal* (Capital Investment Coordination Board)

DKP ..... *Danas Kelautan dan Perikanan* (District Fisheries Office, under local control)

DPK ..... *Direktorat Perizinan Dan Kenelayanan* (Directorate of Licensing and Fisheries, within PSDKP)

EC ..... European Commission

ELE..... Endline Evaluation

EOP..... End of Project

ETA ..... Estimated Time of Arrival

EU ..... European Union

FAD……Fish Aggregation Device

FGD..... Focus Group Discussion

FMA..... Fisheries Management Area

GoI..... Government of Indonesia

GPS..... Global Positioning System

GT ..... Gross Tonnage

HH ..... Household

IDP ..... IsatData Pro[1]

IPP …… International Partnership Programme

IMO..... International Maritime Organization

IUU ..... Illegal, Unreported, and Unregulated (fishing)

KKP ..... *Kementrian Kelautan dan Perikanan* (Department of Fisheries, in MMAF)

KPI..... Key Performance Indicators

LFA..... Logical Framework Analysis

MCS ..... Monitoring, Control and Surveillance

MMAF..... Ministry of Marine Affairs and Fisheries

MMSI ..... Maritime Mobile Service Identity

MPA..... Marine Protected Areas

PPN ..... *Pelabuhan Perikanan Nusantara* (Capture Fisheries UPT, under KKP)

PSDKP ..... *Pengawasan Sumber Daya Kelautan Dan Perikanan* (DG of Marine and Fishery Resources Control (under KKP)

PSMA ..... Port State Measures Agreement

RFMC..... Regional Fisheries Monitoring Centre

RFMO..... Regional Fisheries Management Organisation

SATWAS ..... *Satuan Pengawasan* (Monitoring Unit of PSDKP)

[1] https://www.inmarsat.com/service/isatdata-pro/

SAR ..... Search and Rescue

SDG..... Sustainable Development Goal (of the United Nations)

SIKPI ..... *Surat Izin Kapal Pengangkut Ikan* (License for fish carrier vessel)

SIMKADA ..... *Sistem Informasi Kapal Izin Daerah* (Fisheries Vessel License Database)

SIPI..... *Surat Izin Penangkapan Ikan* (written permission that any fishing vessels must have to conduct fishing activities, which is an integral part of the Fisheries Business License (SIUP))

SIUP ..... *Surat Izin Usaha Perikana* (Fisheries Business License)

SKAT ..... *Surat Keterangan Aktivasi Transmitter* (VMS transmitter license, currently only vessels >30 GT)

SLO ..... *Surat Laik Operasi Kapal Perikanan* (Legal Operational Letter of Fishing Vessel - states that the fishing vessel meets the administrative requirements and technical roadworthy to conduct fishing activities)

ICSOLAS..... International Convention for the Safety of Life at Sea

SOLAS ..... Safety at Life at Sea

ToC..... Theory of Change Model

UKSA..... UK Space Agency

UN ..... United Nations

UPT ..... Technical Implementation Unit

UTC ..... Coordinated Universal Time

VMS..... Vessel Monitoring System

VMS+ ..... Vessel Monitoring System with IDP communication package e.g. Pointrek

WP..... Work Packages

Executive Summary

This 2.5 year pilot project has proven that a low cost VMS+ solution such as the Pointrek IDP system can be successfully used on small (e.g. 10 – 30 GT) fishing vessels in Indonesia's fisheries. It has proved a robust technical solution, although does require additional power supply elements e.g. solar panels and DC converters to supplement the basic power supplies in these relatively basic vessels.

The Theory of Change postulated that fishers would be more likely to accept the requirements to install and use satellite-based vessel monitoring systems if they could access low cost communication and data exchange facilities from the same equipment e.g. the VMS+ solution. Essentially this has also been proven. The M&E cost-earnings analysis results show that, in the hands of experienced and proactive fishing captains, the VMS+ solution can make a real difference to fish catch volumes (increases of 2 – 6%) and vessel profit margins (increases of 2 – 15%). It also saves money on behalf of the vessel coordinators and port agents, where some report 40% savings due to increased logistical efficiency resulting from better coordination and communication.

There are some important caveats through – these results seem strongly skewed towards the more experienced and proactive captains who are motivated to work with other vessels in their group and with the land-based vessel coordinator. Such partnerships only represent about 10 - 20% of the pilot fleet, with the majority failing to take advantage of the free SMS facility (only 12% of the fleet used the SMS facility in the last quarter of the project). Other possible variables also include the size of the vessel (the 21-30 GT class used the SMS more than the 10-20 GT class) and the target fishery (the pilot only covered high-value tuna fisheries, not the lower value small pelagic e.g. sardine fisheries).

The Theory of Change also postulated that fishers would be safer and more contented on vessels equipped with functioning VMS+ solutions. This was certainly the case, with possibly 39 lives saved over the project period as a result of four vessels being able to call for assistance (and automatically provide their exact position) when the vessels were either sinking or incapacitated. The Focus Group Discussions (FGDs) also suggested that the crews and their families were reassured in the knowledge that vessels could be contacted and accountable, even when out of cell tower range.

In terms of illegal, unregulated and unreported (IUU) fishing, the impact of this pilot project is less certain, at least at this point in time. On the positive side, the IDP equipment was able to produce generally reliable spatial and temporal data on the activities of this to date un-surveilled fishing fleet. The new upgrade (*Phinisi*) to the PSDKP Fisheries Monitoring Centres has proven itself to be more reliable and informative than its predecessor. However – primarily because there is no legal mandate for PSDKP to use VMS data for monitoring the <30 GT fleet - this data was rarely used in PSDKP's operational activities in either Jakarta nor the regional UPT and SATWAS centres in the project FMAs. Therefore Outcome 3 (*Levels of IUU reduced*) and 4 (*Improved capacity to plan and implement MCS*) have not been achieved to date.

The project has shown real potential to improve the livelihoods of those dependent upon the pilot fleet, thus contributing to SDG Goal 14 (Life under Water). The longer-term impact of the project hinges upon Outcome 5 (*Policy environment for the use of satellite-based vessel monitoring systems for regulating <30 GT fishing vessels established*) and in particular the lowering of the current 30 GT threshold for the mandatory use of VMS. The project has provided important information (e.g. the catch-earning benefits of VMS+ and the policy & business case analyses) to PSDKP that will allow them to consider reducing the threshold for VMS use to below 30 GT, which is currently under active consideration. This will be further assessed in the Legacy Evaluation later in 2020.

It is recommended that the Legacy Evaluation, currently scheduled for March 2020, should be conducted in either June or September 2020[2] in order to allow a reasonable post-project period to be assessed. This will allow a better understanding of the willingness for vessels <30 GT to continue using the VMS+ solution after project funding ceased in July 2019. It is noted that over the last quarter of the pilot project (April – June 2019), only 8% of the original fleet were still purchasing additional airtime, so continued use may be low.

Overall sustainability of the project was ranked as Moderate (see **Table 10: Assessment of Sustainability Aspects together with rating at Mid and End Lines** on page 56). The key barrier to sustainability is the current lack of policy support for the use of VMS on <30 GT vessels and its continued affordability, especially for smaller vessels in the pilot fleet e.g. 10 – 20 GT).

Ten recommendations are made in this evaluation for the UKSA, project management, KKP and their partners. These include better government stakeholder involvement and therefore ownership in design, potential for grant funding to progress eligible IPP project concepts, a focus on capturing and documenting best practises when using the VMS+ solution (both at sea and on land), as well as the Indonesian Government conducting their own research on the costs and benefits of using low-cost VMS+ solutions such as Pointrek in different fishing fleets outside the pilot area.

[2] This Legacy Evaluation is coupled with the >30 GT Endline. It is also recommended that this is also extended to the same dates, as uptake of pilot vessels has been very slow.

1. Introduction and Background

1.1 Background

Inmarsat is a leading provider of space-based technological solutions, including satellite communications equipment. With the assistance of funding from the ***UK Space Agency as part of the*** , Inmarsat has now completed a 2.5 year project with the ***Kementerian Kelautan dan Perikanan*** (KKP) or the Ministry of Marine Affairs and Fisheries (MMAF) to install satellite-based communications and vessel monitoring systems on board up to 200 fishing vessels (20-30 GT) to assist them communicate vital catch, safety and other information, as well as to bring these vessels under the umbrella of the Fisheries Monitoring Centres (FMCs). This process required the selection of vessels in two Fisheries Management Areas (FMAs) for equipment installation, the training of crews and KKP staff in the use of the equipment and data, and the evaluation of the project results to assist further rollout of the system to other areas and fishing fleets.

1.2 Monitoring and Evaluation

As this is essentially a pilot project, it is essential that the successes – and possible failures – of the project are fully recorded and documented for future use. Inmarsat have engaged ***Poseidon Aquatic Resource Management Ltd*** (UK) and ***PT Hatfield Indonesia*** consultants to develop a Monitoring and Evaluation (M&E) plan for the project, under the overall IPP M&E framework as implemented for UKSA by Caribou Space. This has consisted of the following steps:

- Developing and agreeing the project's Logical Framework Analysis' (LFA) and 'Theory of Change'
- Identify a suite of 'SMART' indicators to measure changes resulting from the project activities and outcomes
- Selection of control sites and collect baseline data for the indicator suite
- Conduct a 'Midline Evaluation' to review progress and fine tune project activities
- Conduct an 'Endline Evaluation' at the project end to assess project outcomes and potential for sustainability and impact.

Table 1: List of M&E reports to date

Report number	Title	WP	Date first produced	Subsequent versions
1371/R/01/C	Monitoring and Evaluation Plan	DI330	31 Mar 2017	3: 12 July 2017
1317/R/02/B	Theory of Change and Intervention Logic (inc. LFA Workshop 12 May 2017)	DI330.1 DI380.1	30 June 2017	
1317/R/03/C	Process for Conducting Baseline, Midline and Endline Assessments	DI330.2	30 June 2017	1.1: 13 July 2017
1317/R/04/A	Key Performance Indicators	DI330.3	30 June 2017	
1317/R/05/A	Monitoring & Evaluation Framework and Baseline Assessment (inc. Dashboard)	DI330.4 DI330.5	1 Aug 2017	3: 28 Feb 2018
1317/R/06/A	Project Progress Report 1 (Q4, 2017)	DI350.1	17 Dec 2017	
1317/R/07/A	Baseline Workshop Report (23 Feb 2018)	DI380.2	28 Feb 2018	1-1: 7 Mar 2018

Report number	Title	WP	Date first produced	Subsequent versions
1317/R/08/A	Monitoring, Control & Surveillance Institutional and Information Flow Baseline	DI330.2	05 March 2018	
1317/R/09/A	Project Progress Report 2 (Q1, 2018)	DI350.1	28 March 2018	
1317/R/10/A	Project Progress Report 3 (Q2, 2018)	DI350.1	03 July 2018	
1317/R/11/A	Mid of Pilot Impact Assessment	DI330.6	21 Sept 2018	
1317/R/12/A	Project Progress Report 4 (Q4, 2018)	DI350.1	21 Dec 2018	
1317/R/13A	Project Progress Report 5 (Q1, 2019)	DI350.1	05 April 2019	

1.3 The Endline Evaluation

The main purpose of this End of Pilot Impact Assessment (Deliverable 1330.7) (or Endline Evaluation, ELE) is to assess the degree to which the project objectives have been achieved. The assessment will investigate whether the project has achieved its expected outcomes and impacts, and specifically whether the intended flow of benefits has been generated and utilised by the intended target groups and beneficiaries, and if so, to what degree. Lessons learnt, and experience gained should then be integrated into the on-going project and used in the planning of future IPP projects to improve aid budget efficiency and impact.

The objective of evaluation-related activities in this IPP project is to check the following outcomes:

1. Improved safety of life, family welfare and financial resilience of fishers through the adoption of VMS/Value added services
2. More effective monitoring and enforcement infrastructure and processes operationalised and adopted by the KKP to reduce illegal fishing in Indonesian waters increasing border control security.

A key sustainability question is whether all the necessary technical, financial, economic and social ingredients are in place to sustain and replicate the piloted VMS/satellite approach managed by KKP in all FMAs in Indonesia in an integrated national MCS approach.

The ELE was undertaken over the third quarter (July – August 2019) and thus includes the final quarterly progress reporting for that period. It was undertaken by Tim Huntington and Willie Bourne of Poseidon, who conducted a two-week site visit to Bali, Larantuka and Jakarta over 21 July – 2nd August 2019. This site visit was also accompanied by 3 KKP staff members from Jakarta, staff from Caribou Space and Inmarsat. Much of the data, organisation and logistics underpinning both the site visit and the quarterly data collection was conducted by PT Hatfield Indonesia.

A final Endline Evaluation Workshop was held on 1 August 2019 to present Evaluation findings to key stakeholders. The subsequent evaluation report was prepared by 16 August 2019 and a draft delivered to Inmarsat as scheduled on 23 August 2019.

A Legacy Evaluation is planned in 2020 (date to be decided). A full review and documentation of success or otherwise of the development goals, lessons learnt and recommendations for future work to both sustain and replicate the systems developed in other Fishery Management Areas in Indonesia will be explored.

2. Purpose and Scope of the Evaluation

2.1 Purpose

Under Work Item I330, an end-of-pilot Impact Assessment is to be conducted and delivered as a 'Endline M&E Report' (DI330.7) at the end of the project. This report therefore presents the status of the project at the end of the implementation period.

As this evaluation is undertaken at the end of the project, we consider this to be an *impact evaluation*. The focus will therefore be on the relevance, effectiveness, impact and sustainability questions (see DI330.1) with a focus on the emerging impacts (or potential for impact) and sustainability of project interventions before project closure.

The Midline Evaluation (August 2018) focused heavily on the relevance, efficiency and effectiveness of project performance through a 'process evaluation' with the aim of providing lessons for management to ensure that the efficiency and effectiveness of the project is maximised over the rest of the project's duration. An assessment was also made of the potential for impact and sustainability at that time. In contrast, this Endline Evaluation investigates, using the LFA indicators for outcomes and impact, the degree of impact and the potential for sustainability and in its conclusions, identifies lessons learnt and makes recommendations that the degree of impact arising may be maximised.

2.2 Scope

The scope of this mid of line evaluation is as follows:

1. **Fishing vessel size class**: this evaluation only covers vessels less than 30 gross tonnes (GT).
2. **Geographical**: this evaluation covers vessels operating from the four ports where the <30 GT vessels are based. According to the current vessel registration database, this is as follows:

Table 2: Gear type, location, size class and number of participating pilot vessels

Port	Size class	No.	%
Benoa	11-20 GT	10	20%
26%	21-30 GT	41	80%
	Sub-total	***51***	
Lombok	11-20 GT	37	20%
43%	21-30 GT	48	80%
	Sub-total	***85***	
Larantuka	11-20 GT	16	32%
25%	21-30 GT	34	68%
	Sub-total	***50***	
Maumere	21-30 GT	11	100%
6%	***Sub-total***	***11***	
TOTAL		**197**	

Time period: **the evaluation covers the entire project duration to date e.g. March 2017 – June 2019.** However, it must be borne in mind that equipment installation (on vessels < 30 GT) did not start until June 2017 and was completed December 2017. The cost earnings analysis started in September 2017, although the most consistent data was gathered between April 2018 to June 2019 (when control vessels were introduced) which represented the main body of data analysed in this evaluation.

Of importance, with the delays experienced in project implementation for the >30GT vessels, which is now considered a separate project and ongoing beyond the life of the original IPP project (the subject of this evaluation), the evaluation analysis focuses almost exclusively on the relevance, efficiency, effectiveness, impact and sustainability of the <30 GT vessel class.

3. Methodology

3.1 Methodology Overview

A detailed outline of the methodology for the ELE was drafted by Poseidon and circulated to project partners in April 2019 in a document entitled "Endline Evaluation Terms of Reference" (see **Appendix B**).

The content of the ELE TOR is drawn from previous work undertaken by Poseidon, including the project M&E Plan (required by Caribou); DI-330.1 Theory of Change; DI-330.2 Evaluation Process; DI-330.5 Baseline report and the DI-330.6 Midline Evaluation.

Of importance, the ELE methodology is also guided by Evaluation guideline issued by Caribou[3] that provides detailed guidance now standard for all IPP project in the purpose of the MLE, evaluation criteria, methods to be employed in field work and report formats and table of contents to be followed.

3.2 Methodology

There are two key areas of evaluation in which this study focuses namely *Process Evaluation* (which assesses the overall efficiency of project implementation to date) and *Impact Evaluation* (*effectiveness, impact, relevance* and *sustainability*). A summary of these are described below:

3.2.1 Process Evaluation

The Process Evaluation will analyse the relevance, efficiency and effectiveness of project delivery. As part of the evidence-based approach to evaluation, the following impact evaluation questions (EQs) were developed for data collection, analysis and reporting purposes (see **Table 3** below):

Table 3: Process Questions, Judgement Criteria and Indicators

Evaluation Questions	Judgement criteria	Indicators
<u>Relevance</u> 1. Has the requirement for satellite-based communications and VMS data provision changed since project conception?	• Availability and use of telecommunication equipment • VMS data for <30 GT vessels demanded by control authorities	• Change in use of satellite phones and SSB radio since baseline. • No. of copies of VMS enabled software installed in PSDKP.
<u>Effectiveness</u> 1. How did the consortium work together? 2. Views of consortium members, end users etc on project implementation ?	• Degree of joint coordination and planning. • Views of key project partners and end users.	• No. of joint planning meetings. • Qualitative semi-structured attitudinal survey
<u>Efficiency</u> 1. Were KPIs, deliverables and milestones delivered on time and on budget?	• Timing of KPIs and dependencies	• Analysis of intended / actual deliveries and consequences.

[3] UK Space Agency: International Partnerships Programme Midline & Endline Evaluation Guidance Notes

Previously in the MLE, a questionnaire was distributed amongst project partners to cover the first period of implementation. However, most of the work-packages (WPs) have already been completed within this period, so it was found not necessary to repeat the questionnaire. Instead an update and review of activities undertaken by responsible project partners was undertaken informally[4] and the IPP project plan with start and completion dates for remaining WPs updated.

3.2.2 Impact Evaluation

As part of the evidence-based approach to evaluation, detailed impact evaluation questions have been formulated to influence decisions in what data to collect, its analysis and how it is reported (Annex A).

In summary, evaluation questions, judgement criteria and indicators for Relevance, Effectiveness and Efficiency criteria were elaborated. Although it is too early to provide a comprehensive assessment of impact and sustainability aspects (as this will be determined in the planned Legacy Evaluation in 2020[5]), it is possible to comment on the likelihood that impact may be achieved and to assess project sustainability against specific criteria.

Specific question areas cover aspects related to the five Project Outcomes, namely:

Outcome 1: Safety and security of mid-sized vessels (20-30GT) and larger (30 GT+) fishing vessels improved using satellite- communication and VMS tech

Outcome 2: Welfare and livelihoods of fishers and their dependents improved using satellite comm. & VMS tech

Outcome 3: Levels of IUU fishing reduced through targeted monitoring, control and surveillance (MCS) resulting from the use of satellite-based communication and VMS tech

Outcome 4: Improved capacity to plan and implement monitoring, control and surveillance (MCS) within the national and local government; and

Outcome 5: Policy environment for the use of satellite-based vessel monitoring systems for regulating <30 GT fishing vessels established

A description of the data collection methods for the ELE is given below:

Table 4: Data collection tools and methods for the End Line Evaluation

tools /methods	Use
Key Informant Interviews	Selected key informants at community level (e.g. Village headmen, head of community level fisheries organisations; head or NGOs/other projects, fish marketing companies or small firms; Collectors and traders, Managers of Marine Protected Areas etc
Focused Group Discussions (FGDs)	Used to gather qualitative information from group work with fishing HHs covering SOLAS, illegal fishing; fishing crew welfare; fishermen livelihoods; fish marketing (input supply/fish selling) strategies; other benefits of improved communication.
Sample Surveys (Vessel Cost-Earnings sample survey)	Quantitative data collected in a formal survey with a sample of pilot fishermen covering a range of indicators (KPI1 to KPI 2) including fishing decision making, fish marketing decision making, fish and input prices, fishing boat catch margins etc; SOLAS, perceived benefits of VMS communication.

[4] In particular with KKP, Marine Change, Hatfield and Inmarsat.

[5] Date of Legacy Evaluation to be decided

tools /methods	Use
SMS / VMS data sampling	There are three potential sources of electronic data that might be used for M&E purposes: SMS message content – messages sent to and from fishing vessels could be analysed in order to categorise them into key message types e.g. (1) Emergency declaration (life-threating, vessel at risk of sinking); (2) Non-emergency declaration (mechanical issue, crew injury, etc); (3) Non-emergency declaration (ceasing fishing, heaving to, returning to port) due to weather; (4) Emergency response; (5) Non-emergency response; (6) Fishing opportunities (vessel to vessel); (7) 3rd party IUU incident observed/reported; (8) Catch / landing / market details; (9) Logistics (ice, bait, food inputs); and (10) Social exchange. SOS broadcasts; and VMS geo-fencing data.
MCS System review	A detailed review of pilot sentinel and control fleet information; existing MCS system and gathering of data for key indicators related to SOLAS, emergencies, IUU detection and apprehension etc. Problems and constraints.

A detailed guide for FGDs and Key Informant Interviews was prepared for fishing vessel owners, captains, crews and fishing family members (wives, family and friends) and for Government agencies engaged in MCS activities in (see detailed checklist of questions in Annex B).

Key stakeholders included:

- Government officials (PSDKP, DKP, BASARNAS and harbour authorities)
- Vessel skippers and crews
- Fleet operators and downstream value chain actors
- Representatives of local communities associated with the fisheries included in the project

3.2.3 Cost – Earnings Sample Survey

Details of the Cost Earnings Sample Survey methodology is presented in **Appendix D** together with a summary of key findings by indicator.

The purpose of the counter-factual Cost – Earnings survey is to identify how the use of SMS information leads to more efficient fishing that results in an array of benefits that affects gross margins and fishermen's income. Indicators monitored in this study (and included in the project LFA) include the following:

OC2-5 - Increased fish catches (kgs/trip)
OC2-6 - Increased gross margins per trip (GM/trip)
OC2-7 - Increased fish catch share income amongst crew members (IDR/day/crew member)
OC2-8 - Reduced time at sea (days/trip)
OC2-9 - Reduced fuel usage (number of 30 litre cans of fuel/trip)

The survey compares key financial and fishing related data from pilot boats with VMS+ equipment on board (Sentinel Fleet) in direct comparison with Control Fleet boats (without VMS+ equipment) sampled in Lombok and Larantuka. Data was collected monthly since late 2017 with solid data sets analysed over a 15 month period between April 2018 and June 2019 after the introduction of control vessels. Outcomes for key indicators and ratios are compared on (1) Quarterly basis (for inclusion in the Project Quarterly Progress report and (2) on a long term timeseries basis (Midline and Endline) and regularly updated in the project LFA.

3.2.4 Endline Evaluation Validation Workshop

In order to allow key stakeholders to review, discuss and validate the ELE findings, a full day workshop was held in Bogor on 1st August 2019, that covered both the ELE findings for <30 GT and M&E issues related to the on-going >30GT VMS project. This workshop, which was attended by various KKP directorates, other government stakeholders and local project partners, included a presentation from the Poseidon M&E team on the preliminary findings of the evaluation, and was followed by extensive discussions on the outcomes, impacts and sustainability issues. As a result of this, various elements of the evaluation were refined and updated, and the workshop is considered a key part of the evaluation validation process. The Endline Evaluation Workshop including the list of attendees, agenda, as well as the ELE team's presentation[6] are contained in **Appendix F**.

3.3 Limitations to Methodology

In project design, Poseidon was mandated and responsible for the design and implementation of the ELE study (under WP DI-330.7). Poseidon is also responsible for all M&E activities on the project with close collaboration with Hatfield's field staff. Under normal circumstances, such reviews are outsourced to independent evaluators to maintain impartiality and objectivity in such an evaluation. As a result, Poseidon's position as a fully independent evaluator is, to some degree, compromised by its ongoing involvement in the project.

The Cost-Earnings data has been used to reasonably good effect in this Endline Evaluation to demonstrate that improved efficiency in fishing related decisions and logistics has improved fish catches, gross margins per trip and income pre crew member per day at sea. However, in the Lombok data series, it proved difficult to collect data from more than 2 or more control vessels each month from April 2018 to June 2019. In some months, there was only one vessel providing trip data each month (*Larosa 01*). This may have had an overall impact on the representativeness of the Control fleet in Lombok. In contrast, the Larantuka Sentinel and Control fleets were well balanced in the number of boats sampled and number of trips registered each month.

On a positive note, the Evaluation Team welcomed three representatives from MMAF Jakarta who joined field work between 22 to 24 July in meetings held with the PSDKP in Benoa port and with vessel co-ordinators, captains and crew in Benoa port. Their involvement confirms the increasing degree of interest the KKP has now in the findings of the IPP project, in particular, in gathering data that provides answers to issues related to policy reform for the <30GT vessel class for MCS purposes.

[6] The English version is in the Appendix, whilst the Bahasa version was used in the workshop. The content is essentially the same.

4. Process Evaluation

The main Process Evaluation was undertaken in the Midline Evaluation in July 2018 (see Document 1317/R/11/A). This section provides a summary of key findings from the Midline Evaluation, together with an update and conclusions following completion of the project in July 2019.

4.1 Midline Evaluation Recommendations – Progress and Status

Progress against the Midline Evaluation recommendations (as detailed in the Management Response Form) is presented in **Appendix E**.

A summary for each recommendation is given below:

Recommendation 1: The UK Space Agency ensure that all of its project managers are grounded in the basic rudiments of project M&E and the use of M&E information in project management functions.

Recommendation 2: The UK Space Agency place more emphasis on the use of a Logical Framework Approach to project design in its Application Form that highlights the identification of Key Results to which identified work packages are directly linked and contribute to. This is in preference to elaborating WPs which are then linked to Key Results later that may lead in difficulty in assignment.

- **Progress made**: Caribou provides initial joining M&E overviews to new Project Officers and then works closely with the POs to continue their M&E learning during the projects and will continue to do so as new POs come onboard. There is strong emphasis on the logframe in the grant application process and grantees should match their WPs to the LFA. More emphasis wil be placed on making sure this happens in future calls.

Recommendation 3: The generic term 'VMS' as used by the project for the PointTrek equipment is both misleading and open to misinterpretation. An alternative short and communicable term should be developed in its place provides a balanced and fair description of the equipment and its services.

- **Progress made**: Now referred to as 'Pointrek' or 'VMS+'.

Recommendation 4: Inmarsat and partners (as it already in motion or planned) focus on improvements to PointTrek equipment and apps (e.g. to develop an interface with Department of Capture Fisheries for e-logbooks, a geo-fence system, weather apps, voice call protocols and solution to battery/power supply issues) in its final VMS solution package.

- **Progress made**: Improvements to Pointrek to include e-logbooks, geo-fencing, power supply issues were mostly addressed. However, despite assistance provided to KKP and requests made, these features are not being used in MCS work mainly due to lack of supportive regulation and capacity as staff prioritise other work.

Recommendation 5: Inmarsat and Partners target Vessel Co-ordinators and Fish Export Companies as the first segment in its marketing approach rather than captains and vessel owners (particularly in <30GT class) who may not fully appreciate the benefits generated in view of investment expenditure.

- **Progress made**: According to the Management Response Form, this aspect has received attention. However, from feedback received from the Service Provider (SP) little marketing of Pointrek (outside of the project) has been undertaken to date. Only four new sets of equipment have been purchased to date (outside of the project).

Recommendation 6: The handline fishery has demonstrated that information and cooperation fed via SMS and the broadband feed can improve fishing efficiency, especially when vessels are fishing as a cooperative group on FADs. This evolving experience needs to be captured and documented and developed into guidelines and advice for maximising fishing efficiency through better communication and data provision.

- **Progress made**: Efforts to document success has been undertaken in ongoing M&E activities and reporting, including this evaluation. However it has not yet been captured in any guidelines or user experience documentation for end users, although it will be included in the final policy analyses to be produced in September 2019.

Recommendation 7: The project needs to continue efforts to demonstrate the potential benefits and cost-efficiencies of VMS+ in the <30 GT domestic fleet monitoring, control and surveillance.

- **Progress made**: Not much has been done since the MLE for MCS purposes. This reflects both lack of supportive regulation and time from PSDKP staff who are busy with other issues. To some extent, more could have been done by the SP to follow up in the use of Phinisi by PSDKP staff. The webpage URL was moved, but nobody informed the PSDKP of the new location, hence the tool has not been opened since April 2019 by concerned MCS staff.

Recommendation 8: Project Exit Plans (for use three months prior to closure) are developed to identify what steps are required to consolidate approaches and systems with key stakeholders; access to sources of funding; and hand over processes, together with roles and responsibilities. Such plans are important for Sustainability as they attempt to embed systems developed and approaches with partners and assist in hand-over. Project management is recommended to complete an Exit Plan by 30 April 2019 and should not be confused with the Sustainability Plan that identifies key activities and milestones between now and the project completion date for implementation purposes.

- **Progress made**: According to the Management Response form, this was done but no further evidence was provided. The purpose of such an Exit Plan is to enhance the chances of sustainability of project outcomes.

Recommendation 9: SISFO, given its experience in this IPP in providing training and coaching on a 1 to 1 basis, which may be deemed costly in terms of coverage and time, investigates alternative Training of Trainer (ToT) scheme for roll out/upscaling purposes that uses Vessel Coordinators or key fish export company staff as trainers in a cost-effective manner.

- **Progress made**: SISFO continued field support and coaching when required, although it appears that less emphasis was placed on this in the last year. No action was undertaken to set up any ToT approach.

Recommendation 10: KKP and Project partners (particularly Hatfield) continue to collaborate closely from now to the EOP, to review the regulatory framework for <30GT vessels using the Background Paper produced on best practice solutions most suited to Indonesian Fisheries and find the most pragmatic solution to VMS application for this vessel class. Lack of regulatory reform was identified as the biggest threat / risk to the project's sustainability and impact. Project Management is encouraged to explore all possible avenues to support KKP in its efforts to approve legislation / decrees to give PSDKP mandate to monitor <30 GT vessels and that carrying VMS is compulsory for these boats whilst at sea.

- **Progress made**: Assistance given but as yet no change in policy to support VMS, which in turn has affected progress particularly under Outcomes 3, 4 and 5. An updated policy paper is expected at the end of September 2019.

Recommendation 11: PSDKP should be encouraged to invest in new processes and Standard Operating Procedures (SOPs) for analysing and surveillance asset tasking for the control of fishing vessels < 30 GT. This effort should be focused at both UPT and SATWAS levels.

- **Progress made**: Not done due to lack of regulations and capacity.

Recommendation 12: Development of formal linkages with BASARNAS and other relevant agencies (e.g. Marine Police and the Indonesian Navy) for SAR, including formalised Standard Operating Procedures (SOPs).

- **Progress made**: Efforts undertaken to set up links. However, the situation remains that SAR agencies are usually informed of emergencies via SISFO / Vessel owners and not directly as intended.

4.2 Relevance to Stakeholders

Project design to target beneficiaries: The selection of community and government level stakeholders in project design is considered highly relevant. The main project thrust is to develop solutions for <30 GT vessel class that are not legally required to carry VMS onboard.

There was a perception resulting from the MLE that as pole and line fishing boats in Larantuka usually undertake short 2 to 3 day trips only, the relevance of the IPP project was perhaps not so important as the SMS communication would not be used as often or effectively as long line fishing boats in Lombok, who went further out to sea and for longer periods. However, this perception has proved false. After 2 to 3 hours from port, when vessels are still in cell phone range, the boats then spend much time fishing in areas with no communication. Vessel owners and captains interviewed in Larantuka highlighted the benefits of SMS communication app in the VMS+ for fishing decision making logistics and safety at sea.

Geographical coverage in project design: In the IPP design, the VMS+ would be installed on vessels in two regions. Given the wide geographical coverage and related difficulties in implementation to cover a wide range of government and fishery stakeholders efficiently, it would be more relevant to focus the model piloting in one region giving a better chance of "proof of concept", even though by doing so, the project tested technology in two distinctly different fisheries.

Institutional Arrangements: Relevant government partners were not fully involved in the project design and appraisal prior to approval. No budget was earmarked for KKP use nor any provision for counterpart funds from the KKP defined for specific activities that would instil a degree of project ownership. In design, the KKP had limited role / responsibility in project implementation. As further evidence of this, no WPs were developed in the ProDoc to provide capacity building for MCS at national and UPT levels to help the Indonesian Government to combat IUU fishing[7]. The outcome was a less than comprehensive engagement from the KKP from the outset, although this has changed towards the project end (KKP sent three staff to accompany the ELE site visit). Although their full participation is essential to project success, the KKP may have felt bypassed. Hence, the unexpected delay and

[7] It is only since early 2018 that special arrangements were made by project management to train PSDKP staff in the provinces through Hatfield and a local consultant.

difficulties in negotiating an Implementation Agreement in 2017. It should be noted that engagement and degree of collaboration with KKP has developed well over the project life as KKP's interest in the project's contribution to their work and MCS mandate has grown, which has been beneficial for the project as a whole.

From a regulatory perspective, vessels >30GT are required to carry electronic VMS by law, whereas <30 GT are not. Consequently, PSDKP and other provincial offices do not have a mandate to take legal action against <30 GT vessels found fishing illegally, although they can refer cases to Jakarta for action. The assumption in project design was that changes in regulatory environment for <30GT would be forthcoming, but the risk was that it may not happen. If so, this may have reduced the chances of sustainability and impact even if VMS solutions and packages are successfully piloted and developed. Had this been assessed as a risk, improvements to project design, through the identification of mitigating activities necessary to help further influence policy change, would have been articulated.

Implementation Arrangements: Implementation arrangements are considered quite elaborate with part time managers working from outside the country remotely but with a local in-country coordination unit at Hatfield. Sometimes emails are not sufficient and frequent face to face meetings are required to ensure full understanding of issues to be addressed and the means to address them. The arrangements set up with Hatfield as the local coordinator with their close links with KKP was well designed and most relevant.

Project timing: The original project timeframe was determined based on the critical path affecting the development technologies for IDP and software rather than the explicit needs of building relations and working closely with the Indonesian Government that requires a more flexible and prolonged timeframe.

M&E arrangements: Compared to other similar development projects, the M&E arrangements for a relatively small short pilot project are considered comprehensive.

Project Log Frame: The revised Log Frame following project approval is broadly considered relevant for the monitoring of Outcomes (by the end of project life) and Impacts (post Project). Flexibility in terms of being able to make necessary adjustments to indicators /targets during project implementation has kept the Log Frame relevant.

Activities are aligned more with Work Packages than the Log Frame. WPs are bundled together targeting identified implementing partners rather than allocated within the Log Frame to achieve specific Key Results and Outcomes. Output indicators in general are poorly articulated and do not link to Key Results, as none were elaborated in the ProDoc.

At the MLE, the Log Frame was adjusted with the addition of one more Outcome 5 at the Project Purpose level "*A low cost affordable VMS /Communication model relevant to <30GT vessel classes that is integrated into the Indonesian MCS system is fully tested and completed with successes and outcomes shared widely with the development community*" with three associated indicators.

At the ELE, following discussions with Inmarsat project management, this was changed to "*Policy environment for the use of satellite-based vessel monitoring systems for regulating <30 GT fishing vessels established*" and the indicators reduced from three to one. A key IPP focus is to develop a fully tested VMS solution model and package (for vessels and technology for MCS/IUU purposes) but this is not explicitly identified at the project purpose level as an Outcome.

4.3 Efficiency and Effectiveness

Project initiation design & procurement: IDP solution designed and shipped to Indonesia. Inmarsat had already designed and shipped VMS equipment <30 GT to Indonesia by March 2017. From a technical aspect, the implementation of the design may be viewed as efficient and effective. Lack of engagement from KKP due to reasons already highlighted caused delays. Management was resourceful in its search for vessels to include in its pilot, so with months of delay, the project was ready to install equipment by early September with final boats recruited by 20 October 2017. The KKP's requirements were mapped and documented effectively by Catapult for use in other important design WPs (DI-210, DI-310.3 and DI-400 series) to develop KKPs' use of VMS in their MCS (both and land and sea based). Hatfield did well in its efforts to resolve issues with the KKP for the selection of pilot boats from the <30 GT class.

PointTrek installed and operational in pilot vessels <30 GT and >30 GT in selected port areas. Once boats were identified, the process of PointTrek installation and training in its use by SISFO was timely and well managed and considered both efficient and effective. Frequent follow up with one to one coaching / problem solving has resulted in high usage of equipment, mainly for communication purposes, especially in Benoa port. In the first year, as reported in the MLE, the majority of vessels used the equipment on most trips resulting in benefits to the stakeholder user groups.

Crucially, feedback from fishermen indicated, at the MLE, that (to their knowledge) no other VMS+ equipment targeting the <30GT vessels is available. At the time of the MLE, of the five other competitor firm's products in the field, PointTrek application was considered the leader in terms of applicability, user friendliness and cost and is the only one offering SMS communication. One year later at the ELE it now appears that French manufacturer CLS is poised to release its latest version of its VMS hardware and software with similar applications to Pointrek together with a low-cost hardware and monthly packages deemed highly competitive (exact details unknown at the time of writing). SISFO are responding with a new payment scheme for Pointrek airtime that allows users to pay for data, rather than the number of messages. This, together with the introduction of new internet-based communications apps such as WhatsApp group chats, means it will be a lot more affordable following the pilot project.

It was noted in the MLE that improvements to the PointTrek system were needed**:** 1) Interface needed for e-logbook data with Department of Capture Fisheries (rather than routed through SISFO); 2) Geo-fence system needs to be set up; 3) A weather system App should be added (weather information sent by the Vessel Coordinators by SMS); 4) fish finder App is commonly requested; 5) Voice Call facility requested and 6) a viable solution needed to power constraints, considered important from IUU perspective if VMS equipment is connected on 24 hour basis. PointTrek is turned off at sea mainly to conserve battery life. DC (Direct Current) controllers were installed on six pilot vessels to extend battery life for testing purposes. By the ELE some progress was made to set up the e-logbook (although not connected with the DKP) and geo-fencing application set up. Finally, cost / affordability would define the success of any future upscaling, if the captains had to buy equipment and monthly packages. This will be defined by package DI370 findings to be released in September 2019 (by Marine Change).

Key findings on best practice on legal aspects of IUU fishery management applicable to Indonesia produced and shared with key stakeholders. The outputs of the consultant in relation to his TOR was done well in the time available and included 35 key recommendations. Following a workshop with KKP in May 2017 to discuss findings, a decision was made not to share the final report with KKP. Key findings regarding EU and other VMS systems in Asia were considered useful. However, based on feedback from KKP, salient points regarding Indonesian fisheries management (which was not part of the original Maritimus TOR) was either lacking or incorrect. These have now been corrected by Hatfield in its Background Paper for regulatory reform for the <30 GT vessels shared in the workshop in late April 2018, and importantly has been used by KKP to some degree in its review of the regulatory environment for <30 GT vessels.

In project design, it was assumed that the KKP would pick up these reports and internalise findings relevant to the Indonesian Fisheries Management into its regulatory framework. The risk was that the report findings produced would never be utilised and sit on the shelf. Project management, through Hatfield, has exercised an important degree of flexibility in the recognition that closer interaction is needed through workshops and meetings to elevate regulatory agenda to a higher level and bring the findings to life. A policy paper regarding regulation was prepared in May 2018 to mixed reviews from KKP. The paper is being updated now for presentation in a workshop with KKP in September 2019. It is hoped that discussions may lead to further consideration in policy and regulatory conditions for the <30 GT vessel class.

VMS technology developed for MCS purposes and Government staff trained in its use for IUU detection. Tasks undertaken in DI-210 and DI-310 aimed to recreate the VMS Web Application based on knowledge of existing application in KKP Command Centre and then enhance it with more reliable system architecture has progressed efficiently. A local consultant used outputs from SISFO WP DI-220.1 to improve the KKP's VMS command centre management system completed January 2018. The web-based VMS application *Phinisi* Fisheries Monitoring Centre (FMC) was developed by May 2018 and after training (by Hatfield and consultant) is now piloted at PSDKP level in Benoa and Lombok for tracking <30 GT vessels. With improvements, the final product was made ready by December 2018 (DI-210.3). Feedback from PSDKP indicate that *Phinisi* is useful but can be improved. Regulatory constraints still prevent data collected for <30 GT being used as court evidence in any prosecution of illegal fishing. As a result it has been little used – indeed at the time of the ELE site visit (last week of July 2019) the *Phinisi* system seems to have been offline for around four months in Benoa Bali and Lombok due to a server change in April 2019.

In November 2017, Catapult worked with KKP covering technical IT VMS related aspects and research in the structure / function of KKP fisheries departments and integration of an improved VMS system. Despite delays, the delivery of the new VMS system (DI-310) was completed by December 2018.

Under DI-400 WP, the objective is to trial the VMS system with KKP patrol boats, assess results and complete a viable integrated VMS system for use by KKP. Following preliminary studies of need, a local Service Provider (SOG) and manufacturer in Batam completed the design in July 2018. By the end of March 2019, one patrol boat was fitted with Fleet One terminals by Inmarsat Australia-based technical team, and the system was integrated with the *Phinisi* web application so that vessels can send / receive data. A final report was produced on the benefits of the trial in June 2019 which was well received by KKP. The project is awaiting KKP's response to the quotation for installation.

Despite initial delays, the development of an improved integrated VMS system for use by KKP in its MCS/IUU detection functions that involve vital components developed and tested under WPs DI-210, DI-310 and DI-400 progressed both efficiently and effectively. The project is awaiting action from KKP.

The project design and focus has been on proving that a VMS+ solution for vessels <30 GT can both serve the fishing community (e.g. through improved safety and fishing efficiency) and the government's ability to monitor and detect potential IUU fishing in this largely un-surveilled fleet. Our view is that these objectives have been largely reached. However the project has not addressed PSDKP's weaknesses in terms of using VMS data efficiently and effectively – and was never designed to do so. In retrospect it would have been good to have considered a parallel capacity-building programme, possibly funded through the UK Department for International Development (DFID), to address this particular need.

Demand and Supply conditions researched, and business model defined. In WP DI-340, human-centred design methodologies were used to understand the behaviour and needs of fishing communities. Outputs assisted Inmarsat to improve their VMS+ technology and product roadmap and assist service providers to develop new VMS service and applications supported by end-user research. Reports were submitted in October 2017 and fed directly into the work of Catapult on WP DI-360 and SISFO used outputs to develop its PointTrek product (DI-120) for the >30 GT VMS equipment. More funds may have improved prototyping, otherwise the WP was efficiently and effectively delivered.

Under WP-360, Catapult in March 2018, interacted with three service providers for VMS+ services, running multi-day workshop with them and providing recommendations from a usability, interface and system architecture point of view, based on research findings of WP I-340. A final report on the additional use-cases and value-add services was produced with recommendations. A guide entitled "*Design guide outlining key service update recommendations before wider commercial roll-out*" was produced. Work was delayed as Catapult was also involved in the I-210, I-310 and I-400 WPs that had to be completed by February 2018, before work on I-360 could start. These delays are not critical. Work done was effective as Service Providers have already integrated advice given in their systems.

The purpose of WP DI-370 implemented by Marine Change is to create a business model for the IDP product developed by SISFO. The expected output is a defined business and financial model for PointTrek together with an indication of revenue streams and a road map for commercialisation expansion within the Indonesian Fisheries Sector. Of all the WPs reviewed, this may be considered the most problematic and the least efficient. An initial assessment of the VMS sector was completed in March 2017 under much time pressure but did highlight key risks to the project (legal, costs and issue of "free" equipment).

The delivery of outputs for DI-370.2 to recommend refinements to the pilot VMS commercial model was seriously delayed from original date of September 2017 to August 2018 due to a misunderstanding between MC and SISFO on the sharing of cost data necessary to develop the Business Model and other submission delays of DI-340 / DI-360 outputs. The delay in the start of the installation of the Pointrek system in vessels impacted the availability of data to conduct a full review of the VMS pilot commercial model and prepare an initial financial model. Thus, the deliverable stated as "Recommendations for refining the VMS pilot commercial model, including business/financial model for commercial sustainability (which included a 10-15 slide set of recommendations that consolidate findings from DI360.1, DI360.2 and DI360.3)" was modified to "Early recommendations for refining the VMS pilot Overview of the Pilot Business Model (BM 1.0)". This was completed in March 2019.

Recommendations for refining the VMS pilot commercial model, including business/financial model for commercial sustainability (DI-370.2) was also delayed. During the period between Oct 2017 and March 2018, the Marine Change team supported Hatfield in the preparation of a report for the Indonesian Government highlighting the early findings of the pilot (BM 1.0). Recommendations for the business model (DI-370.3) that used the outputs of DI-370.2 was finalised in August 2018 and redrafted from

Version 1 to a final version by September 2018. This is due to be updated jointly by Marine Change and Hatfield in September 2019.

Business model produced and shared to consolidate sustainability potential. WP DI-380 uses outputs from DI-370.3 directly and is to deliver a Business Model and Financial Model and Road Map for Fleet One (>30 GT) in Indonesia and Southeast Asia. Activities planned to start in September 2018 together with the planned installation of VMS on pilot >30 GT vessels, but much delayed until September 2019, mainly due to uncertainties about the Fleet One pricing (which was being finalised at the time of the ELE). A workshop is planned in September 2019 (under DI-380.4) to share findings from DI-370.1 and 2 outputs, but much delayed.

The purpose of WP DI-390 is to investigate how the low cost design model can be manufactured locally, to evaluate the new proposed VMS terminal in terms of "Proof of Concept" and to assess potential production partners for producing the prototype. Delays were incurred as the IDP Core module was received late. However, a local manufacturer was identified by Inmarsat and the final low cost IDP terminal prototype has been successfully produced within the tight cost parameters by the revised time deadline of mid July 2018 and within budget. The supplier of the core module did not want to invest themselves in manufacturing and asked Inmarsat to provide all the funding. The production was then switched to PT INTI who are investing to develop the core module themselves based on the previous prototype and software. The new prototype is ready and proved to work as expected / per design. Proof of Concept was completed (within a tight budget) by March 2019 and KKP pilot will start in September 2019.

Knowledge sharing media materials produced and shared with target stakeholders and partners. Information sharing using the Communication Plan has been both efficient and effective in keeping a wide range of (over 100) stakeholders informed with updates and reports produced. With the Devex and Inmarsat micro-sites, a series of articles are shared on progress and outcomes achieved. A Whitepaper was developed by Hatfield was shared with KKP on policy and legislative development for the <30GT vessel class. The Devex VDO media should reach a large audience, but timing of its release was delayed (due to the earthquake disaster in Lombok) to end of June 2019. A final whitepaper (under DI-260.4) on "Fisheries welfare through digital enablement, and effective use of VMS by a modern fisheries agency" was prepared by Inmarsat and shared by end of 2018.

M&E manuals, documents and reports produced in a timely manner. All guidelines, documents and reports on project progress including 3 Quarterly Performance Reports were delivered within the specified timeframe without delay, except the baseline report (delayed). The Log Frame is updated for each QPR report and importantly, adjustments made to indicators and targets based on evidence received from field data, which keeps it both updated and relevant. With hindsight, more pressure should have been applied to hold a workshop to review the Logical Framework with project partners in early 2017. This would both clarify WPs, Key Results, Outcomes and Goals and ensure all partner had clear understanding of project objectives and implementation arrangements. The collection and analysis of field data from SMS usage, Cost-Earnings survey work was both efficient and effective in measuring different outcome indicators.

Efficiency of Implementation Arrangements: The implementation arrangements in the project have been efficient despite the remote locations of different senior project managers. However, there have been occasions where the project may have benefited from periodic face-to-face project meetings (or "project retreat") where through face to face interaction, open and frank conversations between project partners to resolve issues and improve understanding of each partner's role and needs may be held.

5. Economic Evaluation

IPP (under London Economics' and Caribou Digital's guidance) defined a programme level economic evaluation framework using a CEA approach[8].

"As defined in HM Treasury's 'The Green Book', Appraisal and Evaluation in Central Government, Cost-Effectiveness Analysis (CEA) is a type of Value-for-Money analysis that compares the costs of alternatives that achieve different amounts of the same impact. For example, if the type of impacts achieved by two health projects are exactly the same, it is possible to compare the 'cost per unit of impact' to estimate which project is more-cost effective, avoiding the need to monetise impacts that may be difficult to value.

However, the measure of impact needs to be the same across the two projects being compared. It cannot be used to compare projects where the impacts are different, for example a forestry project versus a health project. It cannot either tell you whether the benefits of a particular project are greater than the costs of delivering it. In this way, CEA differs from other types of economic evaluation, such as Cost-Benefit Analysis (CBA) – a type of analysis which quantifies in monetary terms as many of the cost and benefits of a proposal as feasible – since only a costing exercise is undertaken.

The outputs of CEA can be an important input into answering the OECD Development Assistance Committee criteria of 'Efficiency' related to **whether the programme or project used the least costly resources possible in order to achieve the desired impact compared to alternatives**. Without establishing this fact, it is difficult to convince decision-makers of the (net) benefit of investing in satellite-based systems. For this reason, it is critical that robust project-level CEAs – done in a consistent way across all projects – are implemented, in order to support aggregation to a programme-level analysis. This estimate will then serve as an important input into the evidence base for the IPP programme, and the case for continued space-focused development programmes in government.

The objective of the report is to assess whether the programme, using satellites, was the most cost-effective way of achieving the desired impact compared to non-satellite alternatives. We are therefore using cost-effectiveness analysis (CEA) and the cost effectiveness ratio."

The project start date was February 2017 and the project end date will be 30th September 2019. So, the IPP project duration is around 2.5 years. The CEA assesses the costs and benefits of the project for a further 2.5 years after project completion so that impacts can be factored into the analysis (2017-2021). The analysis also assesses costs and impacts over a longer 2017-2023 period as a longer time period allows us to assess how the cost-effectiveness of both the satellite and non-satellite solutions change over time.

More specifically, the cost effectiveness ratio (ratio of costs to impacts) is computed for the following impacts:

KPI 1: Safety and security of mid-sized vessels (20-30GT) fishing vessels improved

- ***Impact indicator = no. of lives saved***

KPI 2: Welfare and livelihoods of fishers and their dependents improved

- ***Impact indicator = change in crew earnings***

[8] London Economics (2018). Cost-Effectiveness Analysis: A Guidance Manual. Issue 2.0

The analysis is done comparing the cost-effectiveness of the satellite solution with patrol vessels and data buoys providing connectivity as well as saving fishermen in distress. The analysis shows that the satellite solution has the lowest cost effectiveness ratio for the two impact indicators considered. A sensitivity analysis is also carried out varying the number of patrol vessels and buoys. The conclusion is that the satellite solution is the most cost effective in maritime environments for the evaluated below 30GT fishing vessels.

CEA Present Value Calculations for the Satellite Solution

The costs for 2017 and 2018 are taken from the actual grant budgets used for the UKSA co-funded project. The CEA ratios for the satellite solution for the 2017-2021 and 2017-2023 project durations are:

- Change in accumulated crew earning per trip for all vessels/crew: £16.75 and £10.57 respectively. These would be the costs to increase the income of all vessels/crew per trip by £1 for the 2017-2021 and 2017-2023 periods, respectively.
- The CEA ratio for number of lives saved are: £66,573 and £48,531 per life saved, respectively. This would be the cost of saving a life of a fisherman on a below 30GT vessel for the 2017-2021 and 2017-2023 periods, respectively**.**

Crew income is not expected to increase much in the 2021-2023 period due to saturation. However, the cost per impact still decreases because the satellite solution can be scaled easily due to its relatively low operating costs.

CEA Present Value Calculations for Alternative 1 (the Patrol Vessel Solution)

The CEA ratios for the Patrol Vessel solution for the 2017-2021 and 2017-2023 project durations are:

- Change in crew earning per trip: £275.98 and £223.31 respectively. These would be the costs to increase the income of all vessels/crew per trip by £1 for the 2017-2021 and 2017-2023 periods, respectively.
- The CEA ratio for number of lives saved are: £1,098,998 and £1,026,723 per life saved respectively. This would be the cost of saving a life of a fisherman on a below 30GT vessel for the 2017-2021 and for the 2017-2023 project periods, respectively.

The fact that the operational cost of the patrol vessels is so high relative to the initial capital cost means that the reduction in the CEA ratio is not as steep as for the other solutions.

Despite this high cost, the patrol vessel solution still does not provide the exact same coverage as the satellite solution. This is because this solution uses one vessel to cover a large area, but it will only cover part of the area continuously as the patrol vessel is constantly moving.

CEA Present Value Calculations for Alternative 2 (the Buoy Solution)

The CEA ratios for the Buoy solution for the 2017-2021 and 2017-2023 project durations are:

- Change in crew earning: £20.23 and £13.45 respectively. This would be the cost to increase the all the crews income by £1 for the 2017-2021 and 2017-2023 periods, respectively.
- The CEA ratio for number of lives saved are: £80,432 and £61,782 respectively. This would be the cost of saving one fisherman's life on a below 30GT vessel.

The large decrease in the costs to save a life between the shorter 2017-2021 and 2017-2023 time periods reflect the high capital investment and low operating costs of this solution. For this reason, the CEA ratio will continue to increase over longer time periods until it is time to replace the hardware. As the buoys are in the sea, the hardware may need to be replaced every 5-7 years.

Table 5: CEA Calculation Summary

IPP Project (2017 - 2021)			Nominal	Real			
Stakeholder	Category of costs	Units	Total real, £	Present value real, £ (2017-2021)			
UK project team	Labour	NA	3,486,848	3,425,777			
	Material, equipment, data	NA	324,994	324,994			
	Travel and subsistence	NA	338,480	331,789			
	Other	NA	142,500	137,470			
International partners (also users)	Labour	NA	405,531	393,717			
	Material, equipment, data	NA	32,499	32,499			
	Travel and subsistence	NA	79,600	77,841			
	Other	NA	150,000	134,408			
			4,960,452	4,858,497			
IPP Project (2017 - 2021)	**Satcom Connectivity**		**IPP Project** (2017 - 2021)				**IPP Project** (2017 - 2023)
	Present Value of TOTAL COSTS		4,960,452	4,858,497			4,987,955
	Present Value of IMPACT 1	Change in crew earning		290,145.75			472,105.50
	COST-EFFECTIVENESS RATIO			**16.75**			**10.57**
Alternative 1 (2017-2021)	**Patrol Vessels**						
	Present Value of TOTAL COSTS		63,895,744	60,188,930			79,176,768
	Present Value of IMPACT 1	Change in crew earning		218,090.03			354,559.85
	COST-EFFECTIVENESS RATIO			**275.98**			**223.31**
Alternative 2 (2017 - 2021)	**Buoys**						
	Present Value of TOTAL COSTS		-	5,869,949			6,349,868
	Present Value of IMPACT 1	Change in crew earning		290,145.75			472,105.50
	COST-EFFECTIVENESS RATIO			**20.23**			**13.45**
IPP Project (2017 - 2021)	**Satcom Connectivity**						
	Present Value of TOTAL COSTS		2,480,226	4,858,497			4,987,955
	Present Value of IMPACT 2	Number of Lives saved		72.98			102.78
	COST-EFFECTIVENESS RATIO			**66,572.99**			**48,531.10**
Alternative 1 (2017-2021)	**Patrol Vessels**						
	Present Value of TOTAL COSTS		31,947,872	60,188,930			79,176,768
	Present Value of IMPACT 2	Number of Lives saved		54.77			77.12
	COST-EFFECTIVENESS RATIO			**1,098,998.23**			**1,026,723.20**
Alternative 2 (2017 - 2021)	**Buoys**						
	Present Value of TOTAL COSTS		-	5,869,949			6,349,868
	Present Value of IMPACT 2	Number of Lives saved		72.98			102.78
	COST-EFFECTIVENESS RATIO			**80,432.30**			**61,782.05**

The cost effectiveness ratio analysis shows that the satellite solution is the most cost effective way to achieve the desired impacts. The patrol vessel based solution is operationally too expensive and the buoy based solution is unproven and risky due to adverse weather in Indonesia. The recent earthquakes in Lombok could have heavily damaged a lot of the buoys as Indonesia is unfortunately in the 'ring of fire' basin of the Pacific Ocean with many active volcanoes and earthquakes.

The ratios for the longer duration (2017-2023) are usually lower as there is a high upfront Capex investment for all solutions. If we look at **Table 6** and the number of lives saved, we can see the largest decrease in the CEA ratio is for the satellite solution. The buoy solution has a consistent reduction in ratios as there is also a large upfront capex cost followed by a relatively low OPEX. An important issue for the buoy solution over longer periods is that all the hardware (capex) may need to be replaced due to the solution being based in the sea.

The only solution with both large capex and OPEX is the patrol vessel solution. The reduction of the CEA ratio over time is therefore rather slow for number of lives saved. For the number of lives saved and change on crew earnings, the satellite solution is both most cost effective and has the highest decrease in the ratio over time.

Table 6: Reduction of CEA ratio from 2017-2021 to 2017-2023 project duration

Solution	Impact Indicator	CEA Ratio, (2017-2021)	CEA Ratio, (2017-2023)	% decrease of CEA ratio
Satellite	Change in crew earnings	**16.75**	**10.57**	**37%**
	Number of Lives saved	**66,573**	**48,531**	**27%**
Patrol Vessel	Change in crew earnings	**275.98**	**223.32**	**19%**
	Number of Lives saved	**1,098,998**	**1,026,723**	**7%**
Buoys	Change in crew earnings	**20.23**	**13.45**	**33%**
	Number of Lives saved	**80,432**	**61,782**	**23%**

6. Endline Outcome Evaluation

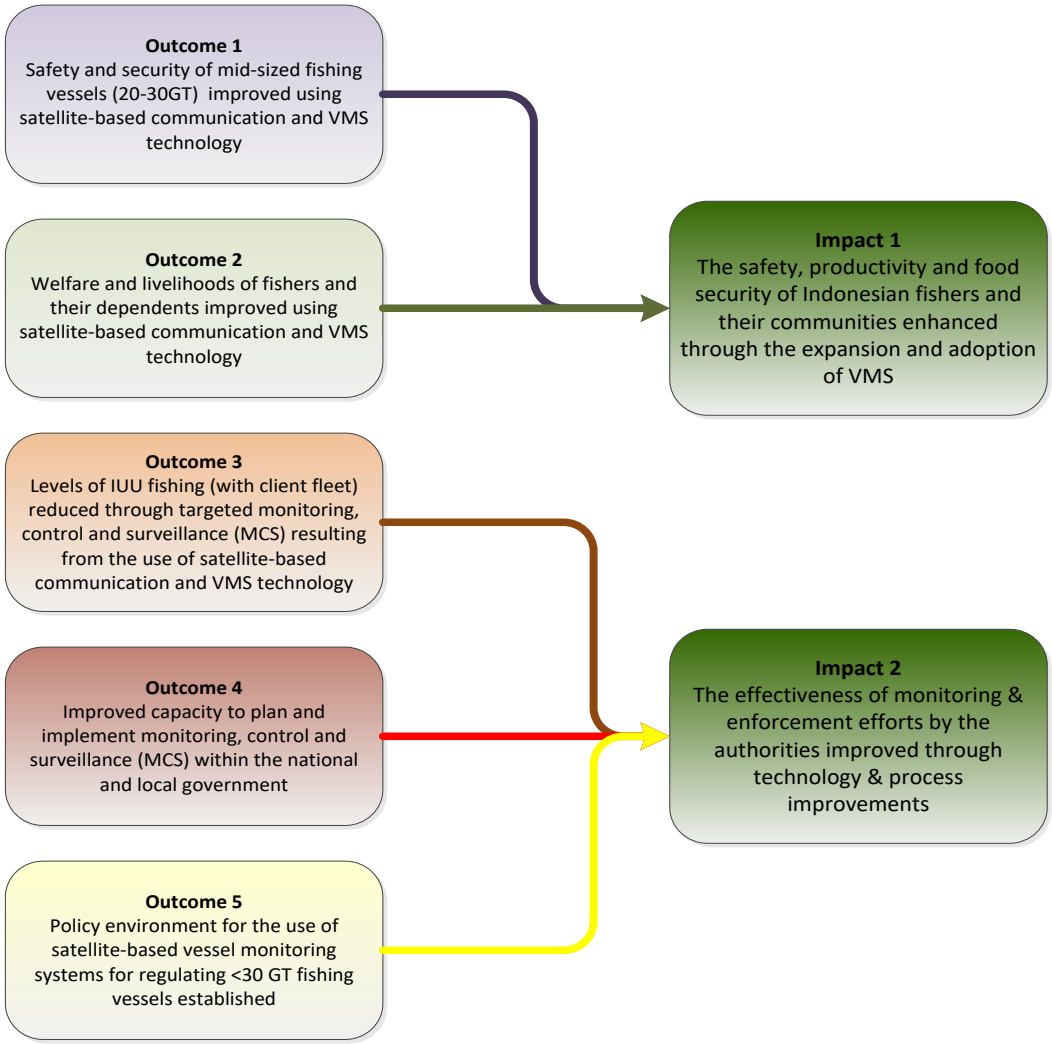
This impact assessment focuses on the emerging outcomes resulting from project initiatives. As such, it is based upon the five outcomes provided in the logical framework analysis (see **Appendix A**). This will be reviewed again at the 'Legacy Evaluation' (planned sometime mid 2020), at which point the impacts of the project will be clearer.

For each anticipated outcome, we have assessed progress against the following four DAC criteria:

- **Relevance**: Does the end product meet demand in country? Is it what users wanted? Is it still needed?
- **Effectiveness**: Did the project meet its objectives as stated in the Log Frame? Why/why not?
- **Impact**: What was the impact of the project? What was the impact compared to the counterfactual situation?
- **Sustainability**: Are the project results sustainable? Has the service been procured? Will project impacts continue after IPP funding ceases?

In this analysis we use data from the associated Outcome and Impact indictors (for pathways, see figure below) collected over the project duration and used in the quarterly Project Progress Reports.

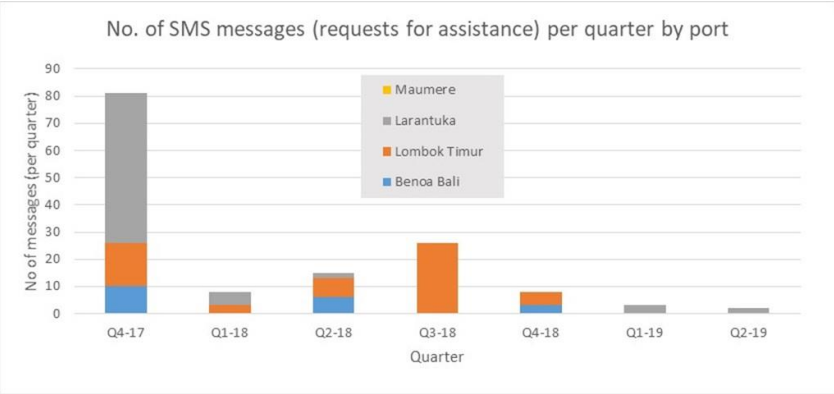
Figure 1: Outcome to Impact pathways



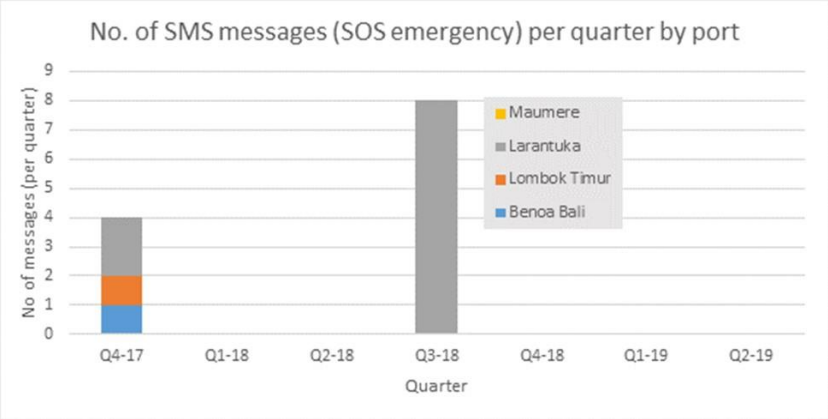
6.1 Outcome 1: Safety and security of mid-sized fishing vessels (<30GT) improved using satellite-based communication and VMS technology

Figure 2: Outcome 1 Indicator Results (by quarter)

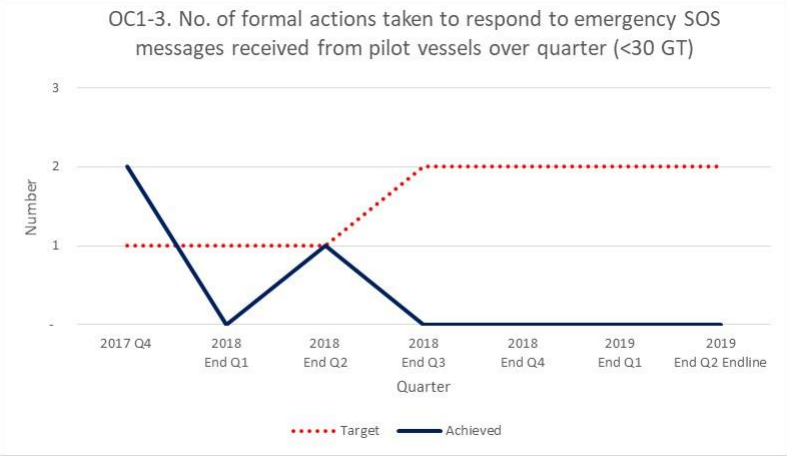
OC1-1



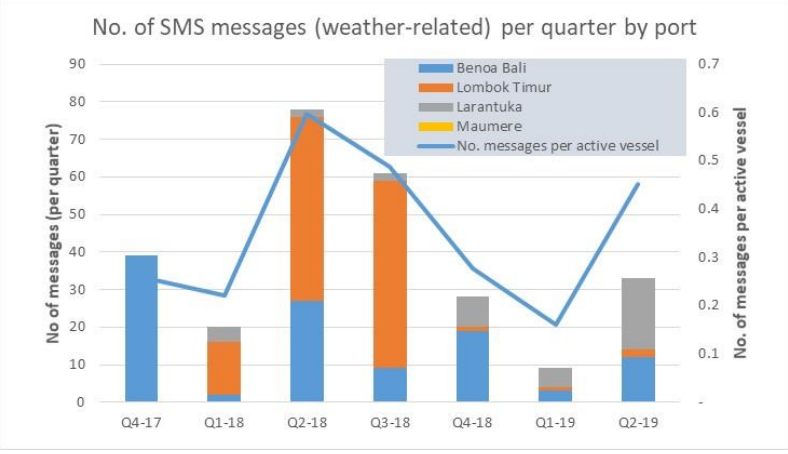
OC1-2



OC1-3



OC1-4



6.1.1 Relevance

- **Improving vessel safety and security is still a highly relevant outcome area**. The considerable number of incidents involving pilot vessels losing power or steerage highlights their vulnerability to mechanical failure. Most of the pilot vessels are old (> 10 years) and poorly maintained. Following an initial peak (mainly false positives during the first quarter after installation), the number of SMS-based requests for assistance remained fairly constant over the project (see OC1-1 in **Figure 2** above)
- The maximum range of land-based cellular telephones is around five nm from the coast. The pilot vessels all fish at least 50 nm from land, including the short trip (2-3 day) pole and line vessels in Maumere and Larantuka, so rely upon satellite-communications over the majority of their trip time. Only two percent of the pilot fleet has single-sideband modulation (SSB) radio. This suggests that **satellite-based communications are essential for the majority of the trip**.

6.1.2 Effectiveness

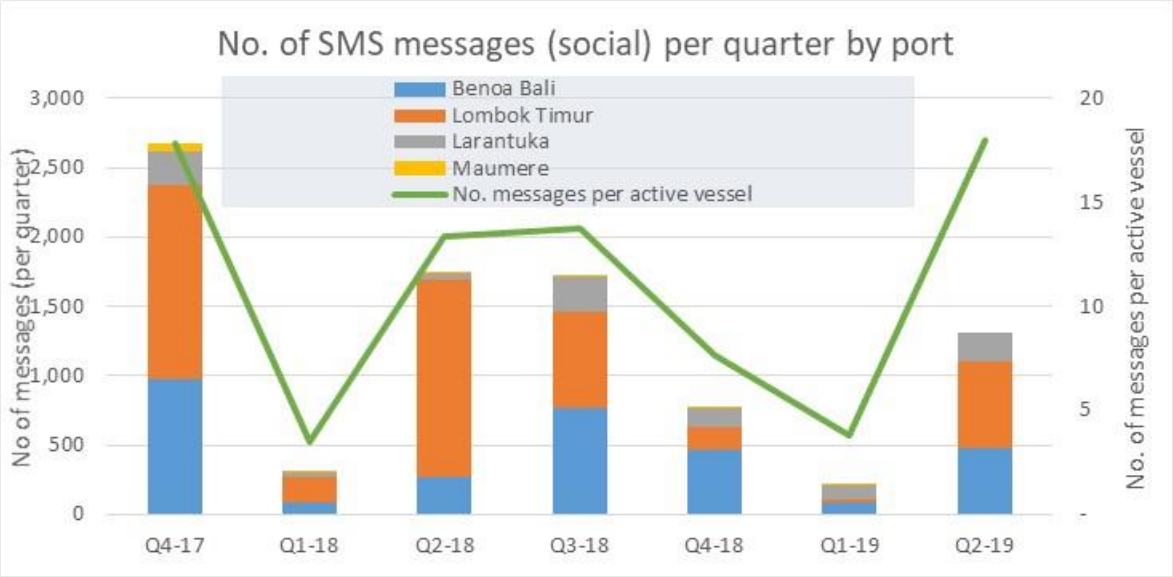
- **The equipment has proved to be highly effective in communicating critical and non-critical emergencies**. Of the 75 vessels whose SMS message content is analysed, three SOS' have been transmitted (see OC1-2[9]) and 143 vessels have declared non-emergency issues (e.g. due to mechanical or crew health aspects, see OC1-1).
- This said, **emergency messages were almost always via SMS to the vessel coordinator or other group fishing vessels**, rather than using the SOS emergency button that is linked to SISFO (who are in contact with the search and rescue SAR agency, BASARNAS). Discussions with fishers and vessel coordinators suggested that the most effective way of eliciting a rapid response was working with other nearby boats. However they did recognise the need to involve BASARNAS in serious incidents, as they could help coordinate with other government agencies (e.g. navy, Marine Police and the coastguard), as well as the local PSDKP.
- **Many potential SAR events can be resolved through SMS communications**. For instance, should any piece of equipment fail, the vessel will often moor up against a FAD and then spare parts can often be brought out by other vessels and repairs made at sea. This also has the benefit in that fishing can be resumed and any existing catch preserved[10].
- **Vessels can now be pre-warned of incoming weather events such as storms or poor sea conditions**. This gives them the option of continuing fishing or running for shelter. The latter will impact fishing but may also reduce damage or even loss of the vessel should the weather event prove to be extreme. Of the 75 vessels whose SMS message content is analysed, 268 messages have been received or transmitted to warn of adverse weather conditions. After a peak in Q2-18, the number of weather-related SMS messages per active vessel declined, before picking up in Q2-19, suggesting a seasonal element to this indicator (see OC1-4 in **Figure 2** above).

[9] Graphic shows a number of false positives

[10] Where fishing is interrupted through mechanical failure for a long period of time, any pre-existing catch may spoil and become unsaleable.

- **The fact that 70% of SMS communication is mainly social exchange suggests that the system is improving fisher and family well-being.** Of the 75 vessels whose SMS message content is analysed, over 8,750 messages have been received or transmitted (roughly 50 : 50) that have no impact on vessel operational safety or efficiency and are essentially of a social nature. It is noted that the majority of social messages is between vessels or back to shore. Families on shore rarely convey social messages to the vessels (mainly due to the cost noted to be IDR 2,000 (£0.10) per SMS) unless they are responding to an incoming message. Again there was a strong seasonal element to this, with less messages per active boat being sent over Q1 than in the main fishing seasons over Q2 and Q3 (see Figure 3 below)..

Figure 3: Number of social SMS's per quarter per port



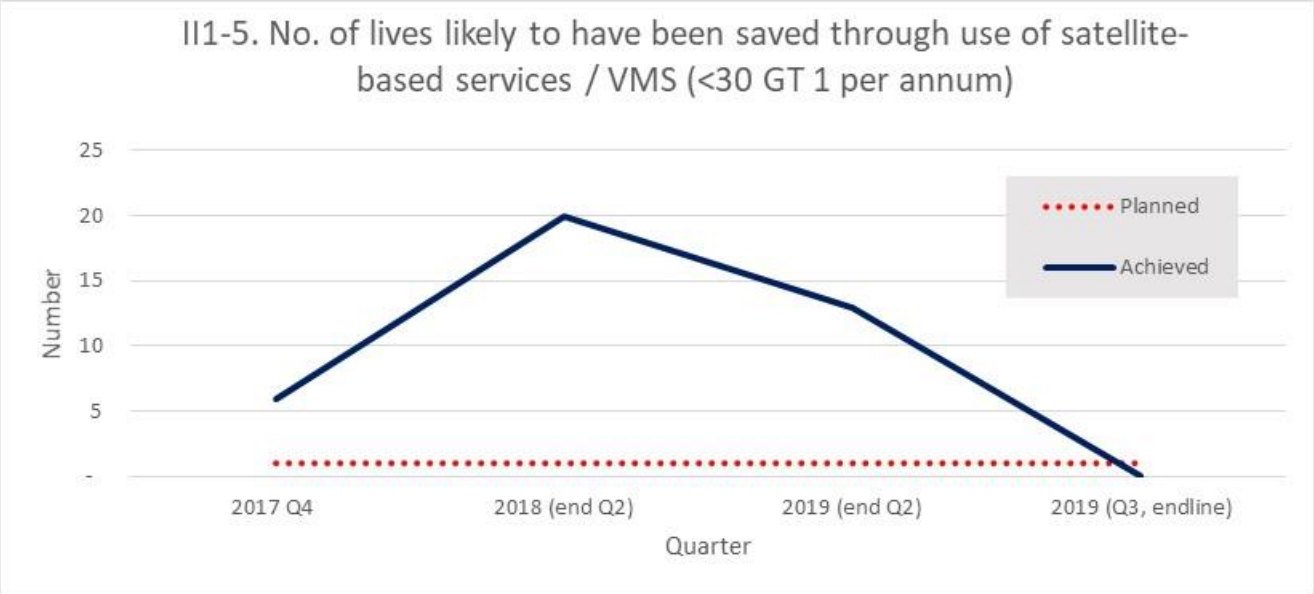
6.1.3 Impact

- **The equipment has proved to be highly effective in resolving critical emergencies**. Since installation in late 2017 to now (a period of 8-9 months) four emergencies (involving a total of 39 crew members, see **Figure 4** overleaf) have been resolved as follows:

    1) ***Rizky Jaya 03 (Benoa Bali, crew of 6):*** Vessel was disabled by mechanical failure. Was taken under tow within 12 hours having contacted a group fishing vessel by SMS. The crew, vessel and cargo were saved.
    2) ***Flores Tuna 09 03 (Larantuka, crew of 20).*** Crew rescued by a non-group fishing vessel within 12 hours of issuing an SOS. The vessel sank shortly afterwards.
    3) ***Aisah 42 (Benoa Bali, crew of 5)***. A crew member suffered a major, undiagnosed medical problem. SMS messages were sent to the vessel coordinator and an SOS made to SISFO and then BASARNAS. Medical instructions were transmitted to the vessel via SMS, including an instruction to return directly to port. Upon reaching port, the crew member was hospitalised, where it was found he had suffered a minor stroke.
    4) ***Flotim 09 (Larantuka, crew of 12)***: Vessel was disabled by mechanical failure. The captain contacted his wife by SMS, who then contacted other fishing vessels. A non-group fishing vessel then arrived within 6 hours and together they resolved the issue. The crew, vessel and cargo were saved.

5) In addition to specific cases noted above, the two Vessel Coordinators based in Benoa interviewed indicated the high value placed on SMS communication to help coordinate the deliver spare parts to boats needing spare parts and the time saved.[11]

Figure 4: No of lives saved through the use of VMS+ over pilot project



- **Both crew and their land-based family feel safer as a result of having secure, long-range communications and vessel tracking**. One captain in Benoa Bali suggested that he sent at least one text a trip saying all was well and that they would be returning on a particular date. Before this, he could only send such a message when he was approaching the harbour and back in cellular phone range (< 5 nm from shore). In another case a captain was in daily contact with his wife during her late stage in pregnancy. Without the equipment he would probably not have gone to sea.
- **There is no apparent impact on crew retention**. At baseline, it was assumed that improved communications and resulting safer boats would increase crew retention rates. Project monitoring to date suggests that this is not the case, as most vessels are family-based and thus don't employ non-family crew. In addition, whilst there can be a small salary for key crew e.g. the Captain, fishing master and chef, most income is based upon the catch share which will be key in retaining crew moral. This conclusion was confirmed by the C-E survey (see **Section 6.2** below).

[11] Pak Nyoman mentioned the use of SMS in 10 incidents since late 2017 and Pak Agung said that he is able to coordinate supplies and spare parts to 2 to 3 of his vessels each trip cycle by sending them out on other boats.

6.1.4 Sustainability

- **The ability to declare and communicate over emergencies was ranked first by the vessel coordinators and also by many captains and crew in the FGDs.** This suggests that the ability to declare, describe and coordinate responses to vessel emergencies is a main benefit of the system, and one which will continue to be demanded after the pilot is discontinued. It also requires little or no additional investment in airtime, except when an emergency is declared, when presumably the cost of additional airtime is insignificant.
- **Anecdotal evidence suggests that the introduction of SMS communication will drastically reduce the cost of emergency responses.** Before the satellite-based SMS system was introduced, if a vessel was lost outside cellular range, (i) it could take up to a week or more before the vessel was noticed to be in trouble and (ii) the resulting searches - by both other fishing vessels and government agencies - would be very expensive. One FGD respondent suggested that a pre-pilot search could cost vessel owners as much as IDR 35 million (c. £2,000) whilst a satellite SMS response might only cost IDR 5 million (c. £275).
- Despite the above, **there are questions over the affordability of the equipment now the project has come to an end** (the free SMS packages were no longer available from August 2019 onwards). The number of active VMS+ users dropped over the project duration from 150 (c. 75% of 200 equipped vessels) to 73 (36% of 200 equipped vessels) (see **Figure 5** below). This aspect is explored more in **Section 8**.

Figure 5: Number of Active VMS+ users (Q3-17 to Q2-19)

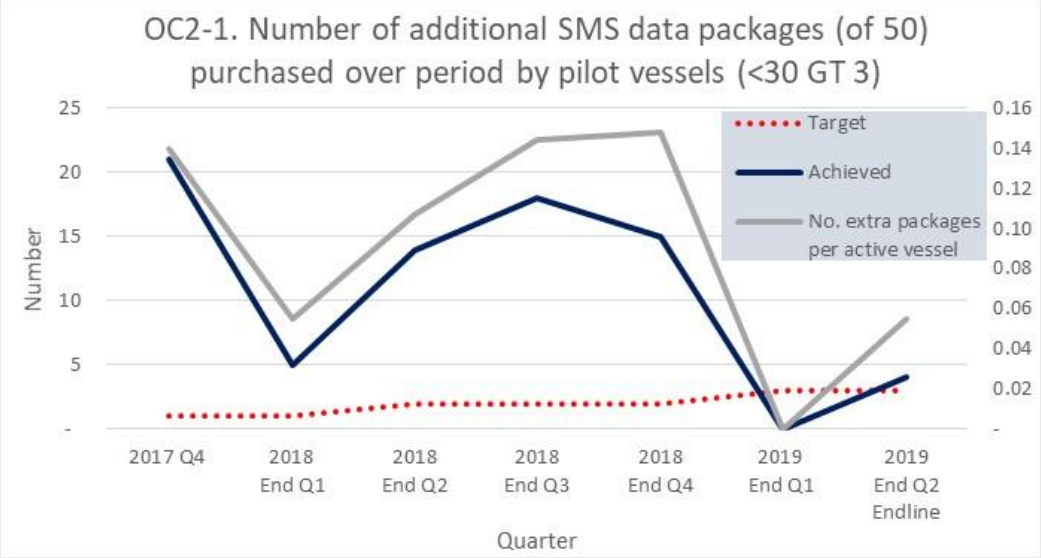
6.2 Outcome 2: Welfare and livelihoods of fishers and their dependents improved using satellite-based communication and VMS technology

6.2.1 Relevance

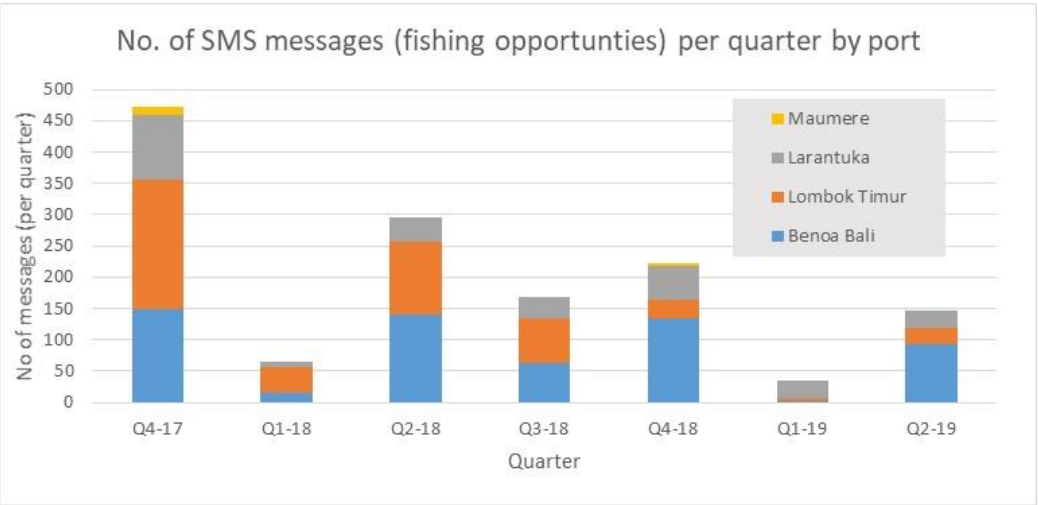
- **In the handline fisheries of Benoa Bali and Lombok, the long duration and coordinated nature of fishing suggests that SMS communication is ideal to assist fishers in improving their fishing efficiency and profitability**. These handline fisheries, which have 10 - 15 day trips based on their group-owned FADs, are often fished in cooperative groups of up to six vessels. SMS communication to share information on FAD fishing status, actual weather conditions and other elements constitute over 11% of pilot vessel SMS use, with over 1,406 messages transmitted or received to date from the sample of 75 vessels whose SMS messages are being analysed. Of these messages, over % of the weighted total[12] were from the handline fleet (in Benoa Bali and Lombok) suggesting fisheries-related communication is particularly important for these fisheries.

Figure 6: Outcome 2 Indicator Results (by quarter)

OC2-1

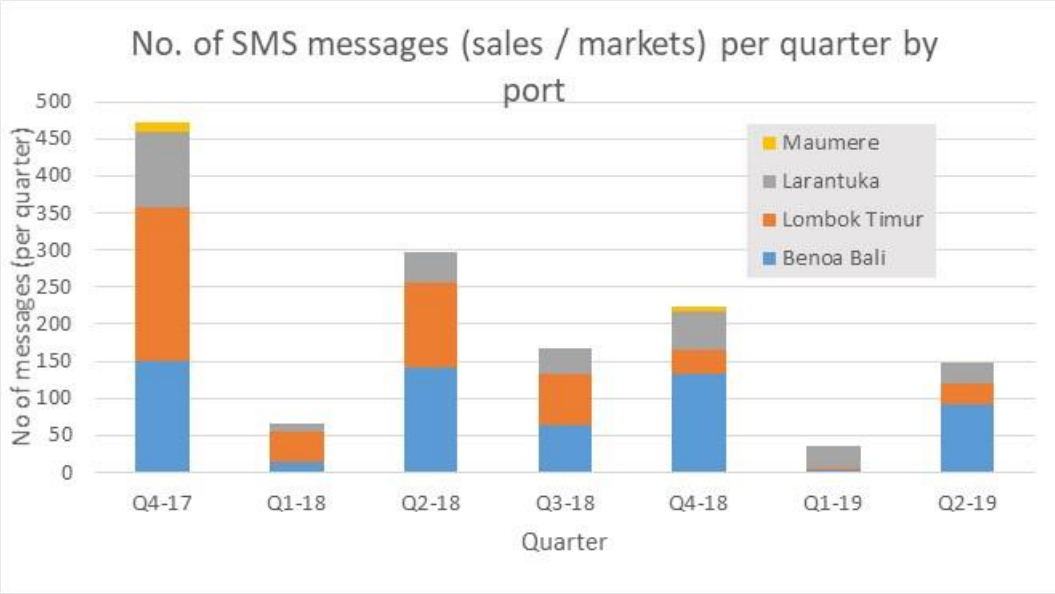


OC2-2

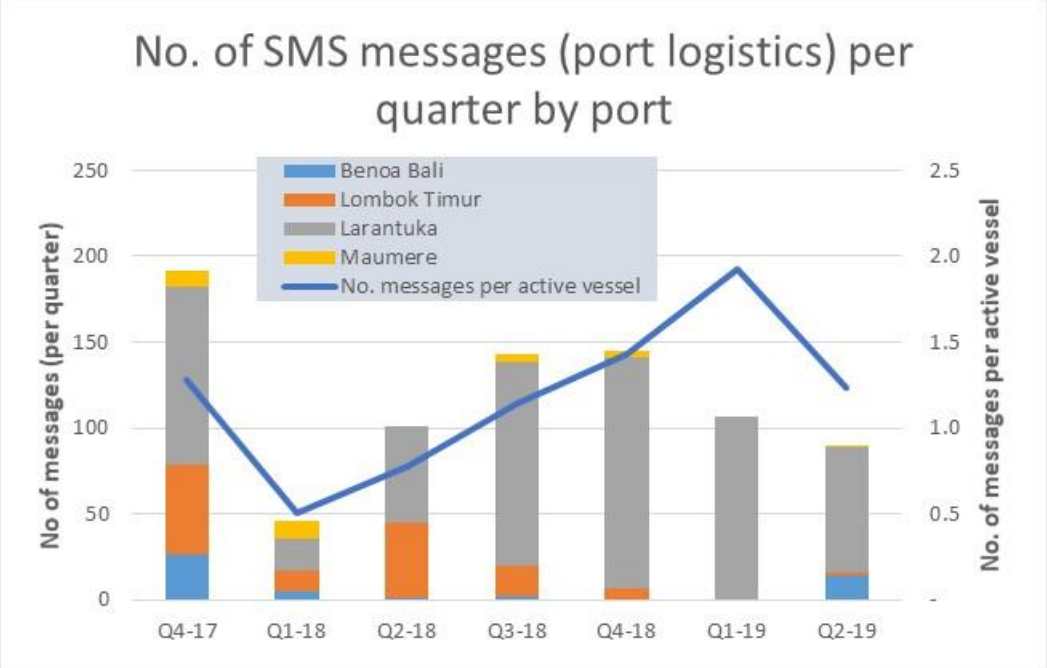


[12] This figure was adjusted to account for the different number of active pilot handline vessels (n=139) and pole and line vessels (n=64).

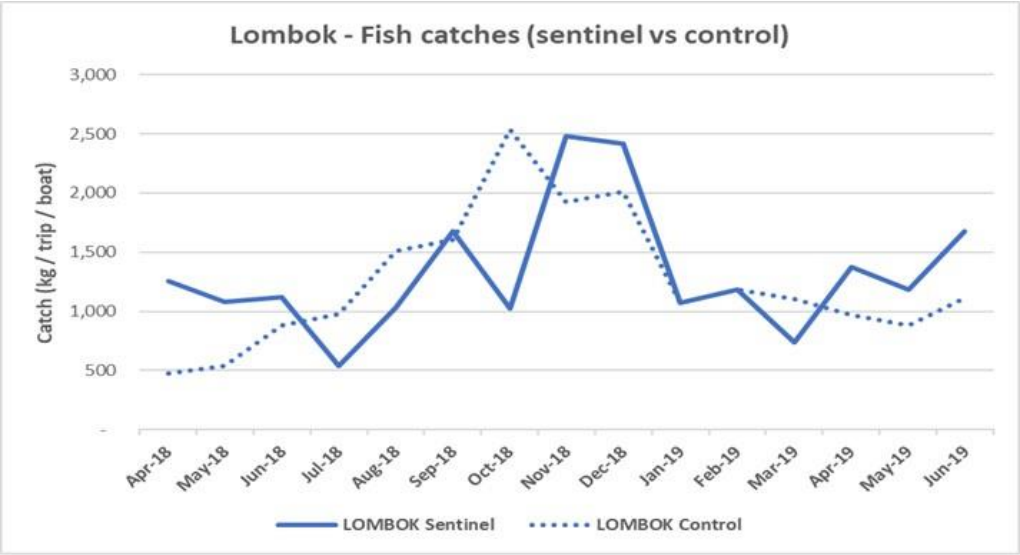
OC2-3

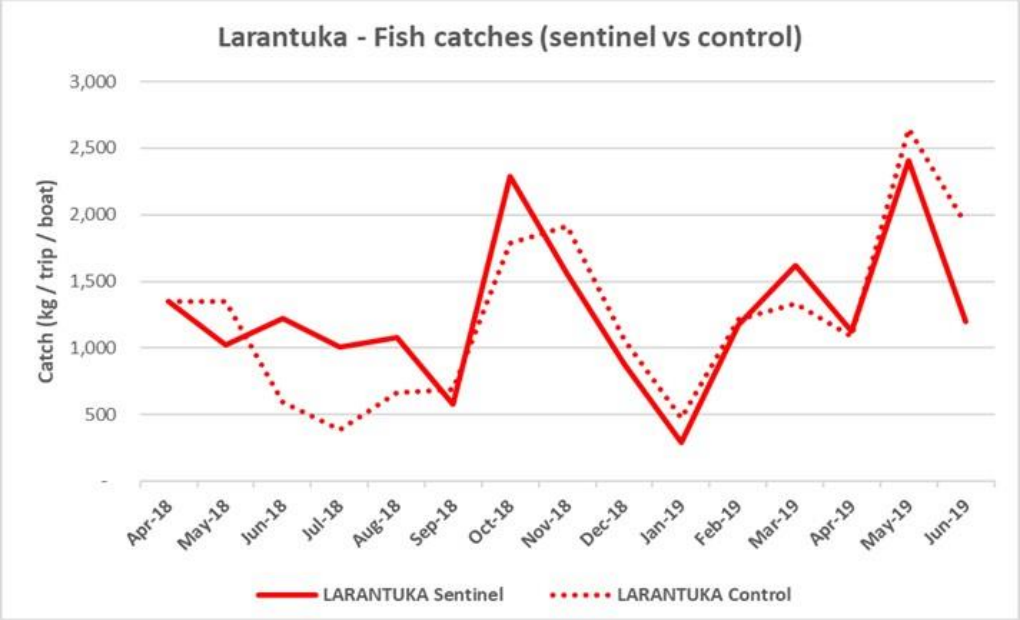

No. of SMS messages (sales / markets) per quarter by port
No of messages (per quarter)
500
450
400
350
300
250
200
150
100
50
0
Q4-17
Q1-18
Q2-18
Q3-18
Q4-18
Q1-19
Q2-19
Quarter
Maumere
Larantuka
Lombok Timur
Benoa Bali

OC2-4

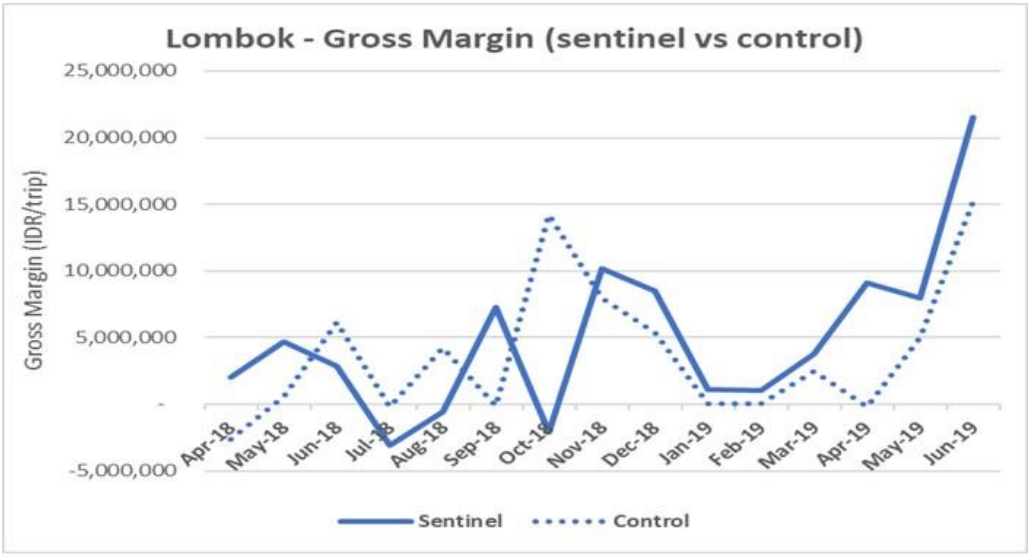

No. of SMS messages (port logistics) per quarter by port
No of messages (per quarter)
250
200
150
100
50
0
2.5
2.0
1.5
1.0
0.5
-
No. of messages per active vessel
Q4-17
Q1-18
Q2-18
Q3-18
Q4-18
Q1-19
Q2-19
Benoa Bali
Lombok Timur
Larantuka
Maumere
No. messages per active vessel

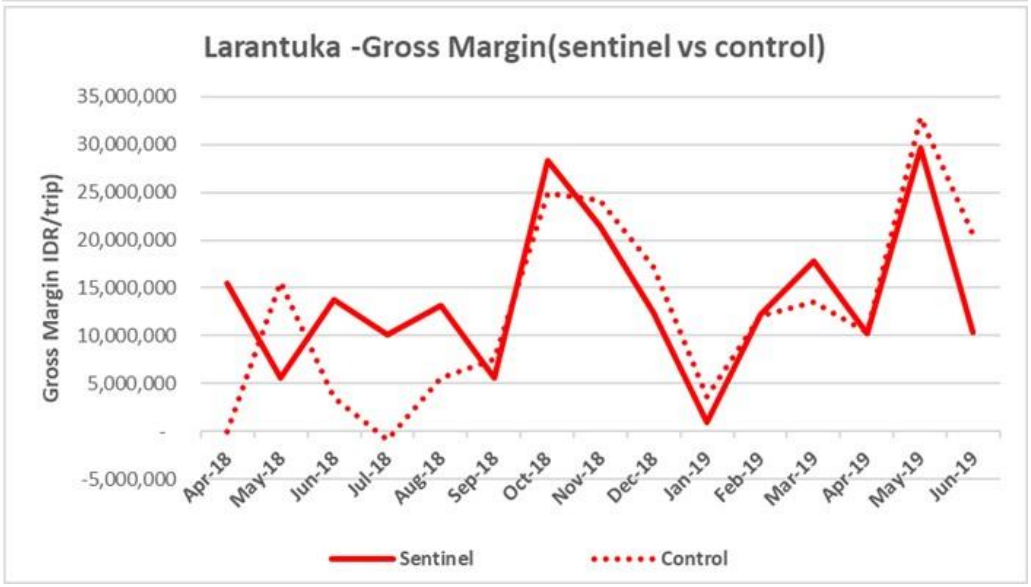
OC2-5


Lombok - Fish catches (sentinel vs control)
Catch (kg / trip / boat)
3,000
2,500
2,000
1,500
1,000
500
-
Apr-18
May-18
Jun-18
Jul-18
Aug-18
Sep-18
Oct-18
Nov-18
Dec-18
Jan-19
Feb-19
Mar-19
Apr-19
May-19
Jun-19
LOMBOK Sentinel
LOMBOK Control

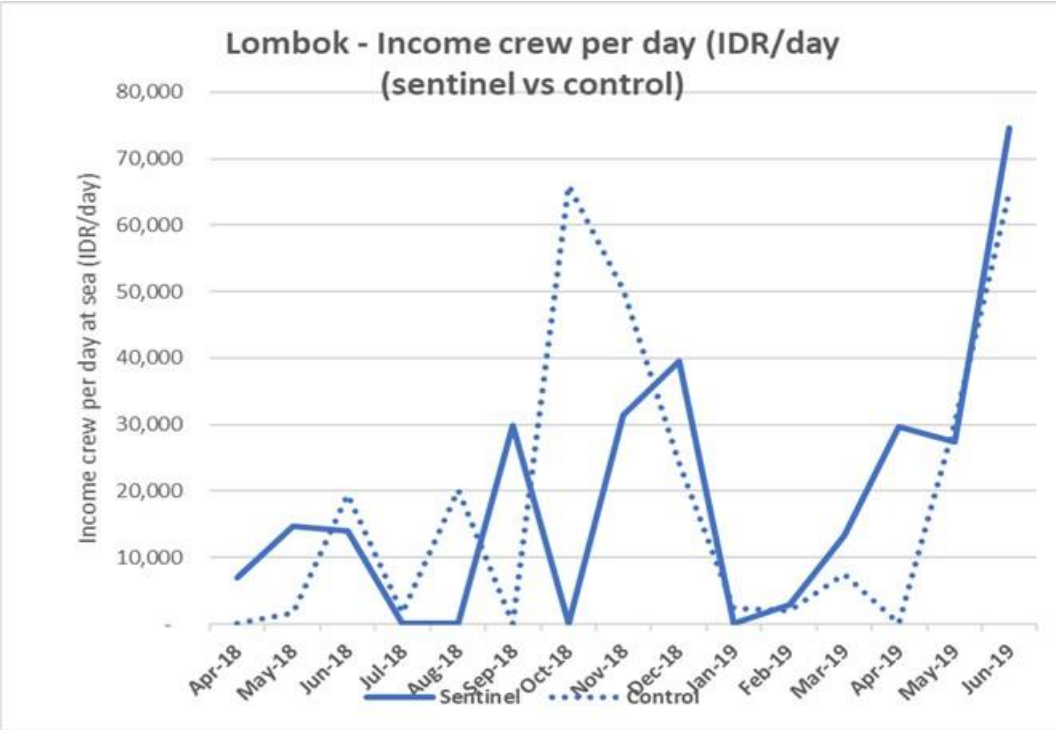

Larantuka - Fish catches (sentinel vs control)
Catch (kg / trip / boat)
3,000
2,500
2,000
1,500
1,000
500
-
Apr-18
May-18
Jun-18
Jul-18
Aug-18
Sep-18
Oct-18
Nov-18
Dec-18
Jan-19
Feb-19
Mar-19
Apr-19
May-19
Jun-19
LARANTUKA Sentinel
LARANTUKA Control

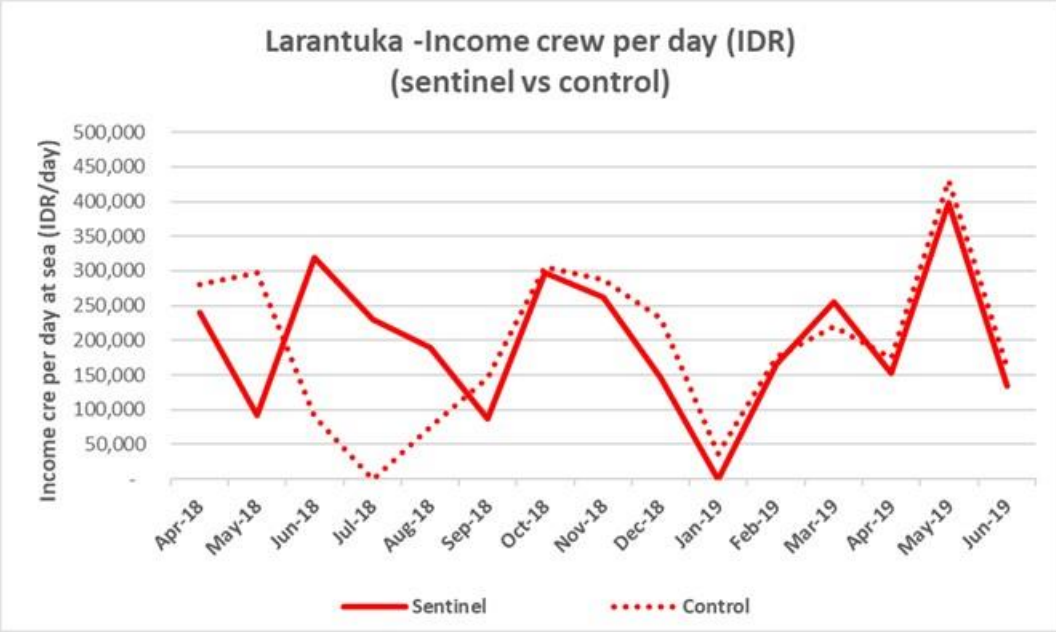
OC2-6


Lombok - Gross Margin (sentinel vs control)
Gross Margin (IDR/trip)
25,000,000
20,000,000
15,000,000
10,000,000
5,000,000
-
-5,000,000
Apr-18
May-18
Jun-18
Jul-18
Aug-18
Sep-18
Oct-18
Nov-18
Dec-18
Jan-19
Feb-19
Mar-19
Apr-19
May-19
Jun-19
Sentinel
Control

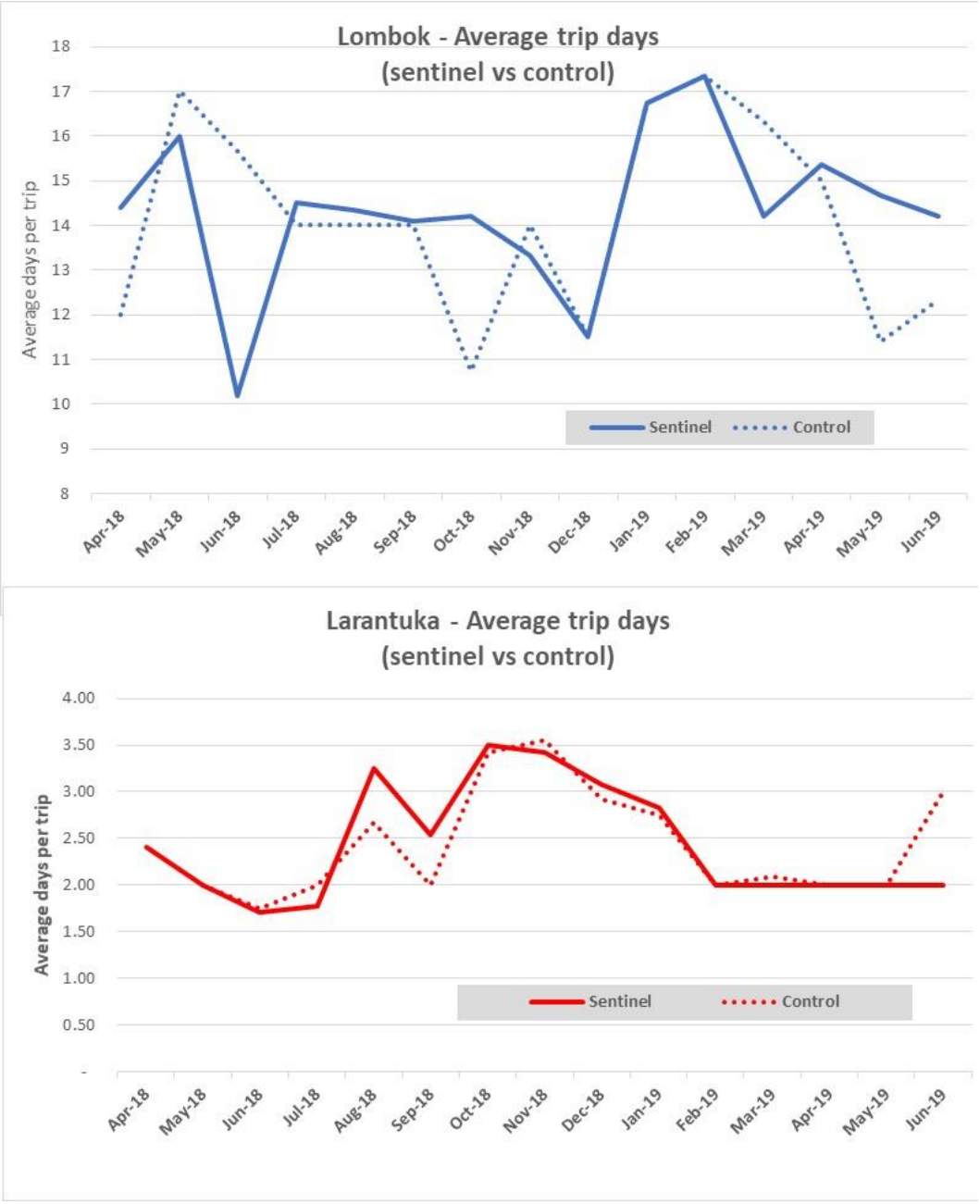

Larantuka -Gross Margin(sentinel vs control)
Gross Margin IDR/trip)
35,000,000
30,000,000
25,000,000
20,000,000
15,000,000
10,000,000
5,000,000
-
-5,000,000
Apr-18
May-18
Jun-18
Jul-18
Aug-18
Sep-18
Oct-18
Nov-18
Dec-18
Jan-19
Feb-19
Mar-19
Apr-19
May-19
Jun-19
Sentinel
Control

OC2-7

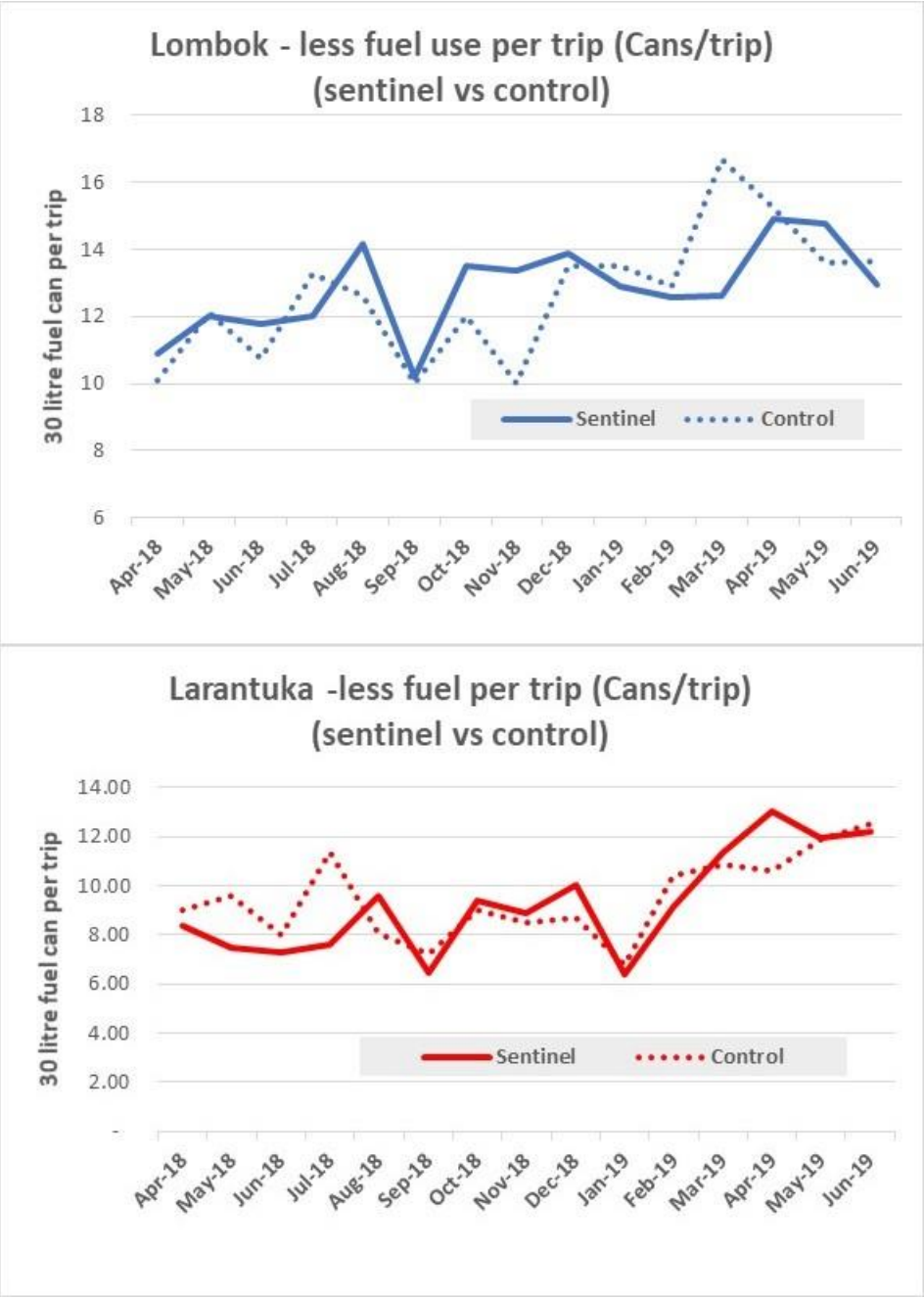

Lombok - Income crew per day (IDR/day
(sentinel vs control)
Income crew per day at sea (IDR/day)
80,000
70,000
60,000
50,000
40,000
30,000
20,000
10,000
-
Apr-18
May-18
Jun-18
Jul-18
Aug-18
Sep-18
Oct-18
Nov-18
Dec-18
Jan-19
Feb-19
Mar-19
Apr-19
May-19
Jun-19
Sentinel
Control


Larantuka -Income crew per day (IDR)
(sentinel vs control)
Income cre per day at sea (IDR/day)
500,000
450,000
400,000
350,000
300,000
250,000
200,000
150,000
100,000
50,000
-
Apr-18
May-18
Jun-18
Jul-18
Aug-18
Sep-18
Oct-18
Nov-18
Dec-18
Jan-19
Feb-19
Mar-19
Apr-19
May-19
Jun-19
Sentinel
Control

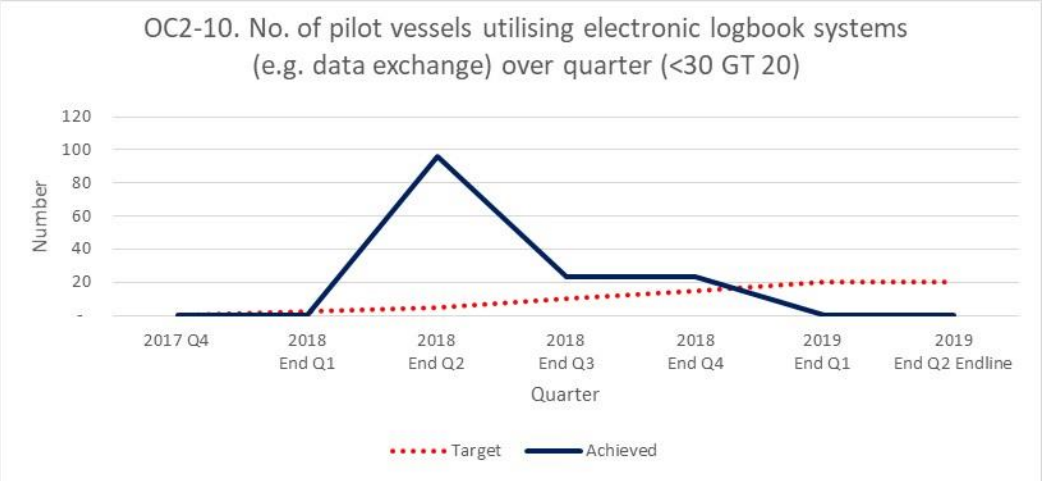
OC2-8


Lombok - Average trip days
(sentinel vs control)
Average days per trip
18
17
16
15
14
13
12
11
10
9
8
Sentinel
Control
Apr-18
May-18
Jun-18
Jul-18
Aug-18
Sep-18
Oct-18
Nov-18
Dec-18
Jan-19
Feb-19
Mar-19
Apr-19
May-19
Jun-19
Larantuka - Average trip days
(sentinel vs control)
Average days per trip
4.00
3.50
3.00
2.50
2.00
1.50
1.00
0.50
-
Sentinel
Control
Apr-18
May-18
Jun-18
Jul-18
Aug-18
Sep-18
Oct-18
Nov-18
Dec-18
Jan-19
Feb-19
Mar-19
Apr-19
May-19
Jun-19

OC2-9


Lombok - less fuel use per trip (Cans/trip)
(sentinel vs control)
30 litre fuel can per trip
18
16
14
12
10
8
6
Sentinel
Control
Apr-18
May-18
Jun-18
Jul-18
Aug-18
Sep-18
Oct-18
Nov-18
Dec-18
Jan-19
Feb-19
Mar-19
Apr-19
May-19
Jun-19
Larantuka -less fuel per trip (Cans/trip)
(sentinel vs control)
30 litre fuel can per trip
14.00
12.00
10.00
8.00
6.00
4.00
2.00
Sentinel
Control
Apr-18
May-18
Jun-18
Jul-18
Aug-18
Sep-18
Oct-18
Nov-18
Dec-18
Jan-19
Feb-19
Mar-19
Apr-19
May-19
Jun-19

OC2-10


OC2-10. No. of pilot vessels utilising electronic logbook systems
(e.g. data exchange) over quarter (<30 GT 20)
Number
120
100
80
60
40
20
2017 Q4
2018 End Q1
2018 End Q2
2018 End Q3
2018 End Q4
2019 End Q1
2019 End Q2 Endline
Quarter
Target
Achieved

- **In the pole and line fisheries of Larantuka and Maumere, the short duration and independent nature of fishing suggests that SMS communication is less likely to assist fishers in improving their fishing efficiency and profitability, although this may change during poor fishing conditions in the low season**. These pole and line fisheries, which have only 1-3 day trips on community FADs in the south and free-schools in the north mostly fish alone. They are notoriously competitive and rarely share information e.g. fishing and weather conditions with other vessels. This is supported by SMS message monitoring, where only 38% of the weighted total were from the pole and line fleet. It is also supported by the FGDs, where the use of SMS and vessel tracking for fishing-related decision-making was ranked lowest by vessel coordinators and crew. One period of the year where more SMS-mediated cooperation might develop is over the low season in the Flores / Timor area when fish are relatively scarce and difficult to find. Some fishers suggested that increased levels of cooperation would assist catching efficiency. However, vessel owners interviewed indicated that before the pilot, they would only know the estimated time of arrival 2 to 3 hours in advance once the vessel was in cell-phone range. But now with 7 to 8 hours' notice, their logistics and boat turnaround was much improved leading to the benefit of an additional fishing trip each month during the high season.
- **SMS communication and vessel tracking are relevant to other parts of the value chain**. For both the handline and pole & line fisheries, the land-based components of the supply chain, such as the vessel coordinators, first buyers and processors have all benefited from the SMS communication and vessel tracking. The vessel coordinator in particular has proved a key stakeholder in the value chain, especially in the handline fishery where he may coordinate the administration, provisioning, fishing activities and landings of a number of fishing vessels. First buyers (often acting for nearby fish packers and processors) are also key figures, as they rely upon consistent supplies of appropriate quality fish.

6.2.2 Effectiveness

- **The PointTrek installation process was generally trouble-free**. Although delayed due to the late signing of the implementation agreement with KKP, installation of the equipment on vessels <30 GT was conducted efficiently and did not impinge on fishing time nor cause any unintentional issues.
- **PointTrek support is largely adequate but could be improved**. Most stakeholders considered that the initial training was well conducted and comprehensive, both for the on-board equipment as well as the supporting software / applications. Most vessels have a crew member who is responsible for its use and is not necessarily the captain e.g. can often be a more computer literate and often younger member of the crew. A number of aspects could be improved e.g. the manual could be made available in electronic form (so it can be shared amongst the crew and the boat's value chain) and periodic refresher training offer to allow users to clarify issues and learn about any updated features.
- **Power issues are still a main issue for users**. Whilst at the MTE stage every user contacted over the MTE complained over the short battery life (max. two days) for the integral power supply, the situation had improved by the ELE. This was mainly addressed by the fitting of (i) trickle charging from solar panels and (ii) the installation of DC converters. This issue is well known to the project but was nevertheless a major constraint to maintaining constant VMS coverage. It is related to the power generation and storage capability of these <30 GT vessels, where alternator and lead acid storage batteries are often old and in poor condition.

- **The equipment shows considerable promise to improve the efficiency of fishing trips in terms of reducing costs and increasing catch values.** Fishing is essentially a hunting operation that requires information on the location of migratory stocks and their catchability. With the handline fishery and much of the pole & line fishery dependent upon using Fish Aggregating Devices (FADs) to concentrate fish, information on the biomass and species is key, as is the local weather conditions. The pilot vessels, especially in the handline fishery, operate in groups and keep each other informed of how the FADs are fishing, thus allowing vessels to focus on the productive FADs and ignore those which are fished out. This ability to target FADs means less sea miles between fishing sets, thus reducing fuel and CO_2 emissions, as well as shorter trips. This in turn reduces ice consumption and potentially increases fish quality. Both the vessel coordinator and group vessels may communicate with each other on the status of fishing on particular FADs. As discussed above, this potential will be increased during the low fishing season when fish are scarcer and cooperative fishing more effective. The impact of this is examined in the next section.
- **Benefits derived from the VMS+ are strongly correlated with the expertise of the captain and level of cooperation with the Vessel Coordinator.** For instance *Flotim 24* in Larantuka had a high level of SMS use (25% of all SMS exchanged in Larantuka out of 16 active boats) and showed large benefits in terms of catch, profitability, income per crew member compared to control fleet vessels (all above 30% increase from control). The vessel spent the same time at sea but used more fuel (19%) to reach FADs with fish.
- **Logistical efficiencies can be improved through good communication and vessel tracking:** Discussions with both vessel coordinators and buyers suggests that vessel turnaround time can be considerably reduced if the vessels communicate arrival times, catch volumes and details, spare part and maintenance needs in advance. One FGD in Larantuka suggested that trip numbers had increased from seven to ten as result of shorter turnaround times.
- **There is potential for integrating administrative procedures into the software.** According to the FGDs, it can take up to half a day to get permission to sail and complete any necessary pre-sailing inspections by PSDKP. Although absent at present, it may be possible to automate some of these procedures, benefiting both the vessel and the authorities.
- **The software is good but could be improved.** Although we did not do an extensive user experience analysis, both the current software and Android app were considered good by most users. However, as with most new software, it could be improved through a simpler interface. Software functions such as the e-logbook are sometimes difficult to use, especially when entering catch data with wet hands. New functions sought after include fish finders, weather forecasts and voice call apps.
- **Training is good but limited to equipment function and does not cover its potential uses.** It is understood from the FGDs that the training on the use of the equipment to send and receive messages and data was comprehensive. However it was purely technical, and there is a real need to work with project beneficiaries to teach them how to apply this technology to improve efficient and sustainable fishing.

6.2.3 Impact

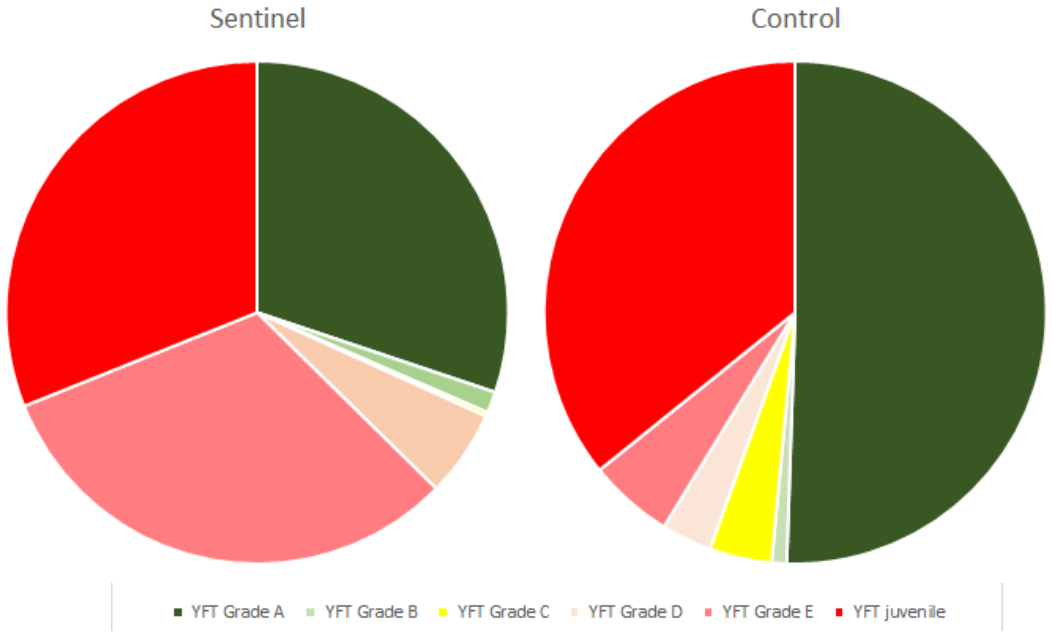
- **Experience to date suggests that vessel profitability and crew incomes can be considerably increased through use of PointTrek and its associated apps.** Experience to date suggests that vessel profitability and crew incomes can be considerably increased through use of PointTrek and its associated apps. In addition to positive anecdotal feedback received through FGD and interviews with fishing captains, crew and vessel coordinators of the benefits of improved communication, findings from the C-E sample survey confirm further that this is the case. Fish catches were higher for both Lombok (6%) and Larantuka (2%) for sentinel fleet compared to control vessels (see **Figure 6**, OC2-5), translating into improved margins in Lombok (25% higher than control) and Larantuka (1.5% higher than controls), see OC2-6. Overall crew members on Sentinel fleets had a higher income per trip than Control boat crews (Lombok 4.8% more; Larantuka 2% more, see OC2-7. Sentinel vessels spent slightly more days at sea compared to the Control fleet in Lombok (0.30 day per trip), whilst Sentinel and Control vessels in Larantuka had very similar time at sea, probably reflecting their shorter fishing trips. Sentinel boats used marginally more fuel compared to Control boats in Lombok (0.16 can per trip more) and less fuel in Larantuka (0.2 can less fuel). For a more detailed analysis of the cost-earnings results, see **Appendix D** on page **79**.
- **There is considerable variation between fisheries and vessels in terms of impact on vessel profitability**. Evidence from the C-E survey for specific indicators noted above confirms that boats with PointTrek have better catches and higher margins when actively using the device and its communication capabilities. This is explored further below.
    - In the Flores – Timor pole & line fishery there is much emphasis on the skill of individual captains in finding skipjack schools, especially during the low season. There is some suggestion (from the FGDs) that, because of the commercial sensitivities involved they are reluctant to cooperate with other boats and land-based information sources and are thus less likely to use the equipment to target their fishing.
    - Feedback from FGDs and other interviews confirm the nature of potential impact of the use of PointTrek and phone apps used by vessel coordinators, however difficult to quantify precisely in monetary terms. One Vessel Coordinator[13] in Benoa estimates that through advice given to almost all of his fleet boats on where to fish, an increase in catch up to 10-20% in catch weight is attained by some 70- 80% of the boats, the others arriving at the recommended fishing location too late to benefit. Fuel usage reduced by 5 to 10% (410 litres instead of 450 litres per trip) and days at sea reduced by 3 or 4 days (for handline boats). Unfortunately, as the C-E survey does not include boats from Benoa[14] (only Lombok and Larantuka) this could not be verified.
    - The same coordinator estimated he saved 40% in his logistic costs through a more targeted (e.g. based on SMS-based information from the boat) portside fish collection, land-based ice purchases and other logistical costs, although this was not formally quantified.

[13] Pak Nyoman at Benoa Port Bali

[14] Due to the lack of any control boats in Benoa for comparison purposes

- The Theory of Change expected that, with less days at sea due to the use of PointTrek to direct fishing activities, fish arrive in port fresher. However price is dictated first and foremost by size and weight and non-special price premium given for freshness. No impact was detected in either the grades or prices achieved for landed fish. An analysis of the yellowfin catch component of the Lombok handline fishery over the project duration found a lower volume of 'baby' (juvenile) yellowfin in the control catch, but also less Grade A and more poor grade E (see **Figure 7** below). Overall the catches had a similar composite value. .

Figure 7: Fish grade distribution (Lombok yellowfin tuna catch component)



- Once traceability for export products becomes the "norm", then vessels with PointTrek equipment that can prove location of catch will have an advantage, although it is most likely through those vessels who cannot prove location of catch missing out of the export market and premium prices.[15].

6.2.4 Sustainability

- **The key users of the equipment are the vessel coordinators and vessel skippers**. The vessel coordinator benefits from a wide range of functions, including *SMS messaging* (to direct fishing based on information from other boats, receive information on the fish catch, organise logistics and to altered him of any threat to the vessel), *vessel tracking* (to note the location of the vessels in their coordination unit, to coordinate FAD fishing, identify nearby group vessels in case of an emergency and to judge landing times) and *software apps* (such as e-logbooks, weather and sea state data and market information). In most cases the device has become an essential business tool for vessel coordinators and major buyers, and they are likely to be major advocates – and probable funding partners – for the equipment once the pilot project is over.
- **Many of the pilot vessels did not use the SMS facility**. Colour-coded **Table 7** (handline vessels from Benoa Bali and Lombok) and **Table 8** (pole & line vessels from Larantuka and Maumere) show the percentage use of SMS over each quarter by vessel and port. This shows that SMS use is dominated by a small number of boats in each fleet e.g. *Star Mild 12, Rizky Kumala 02* and *Raja Timur* in Benoa Bali, *Indraku* in Lombok, the *Flotim* fleet (24, 25, 07 & 21) in Larantuka and *Gemala-NTT -1* in Maumere. As discussed earlier, these boats have a much

[15] Personal communication Lucas Papierniak (Primo Indo Ikan Company)

higher economic benefit than those vessels not using the SMS much (and therefore are virtually indistinguishable from the control vessels). The implication is that VMS+ benefits (and project outcome at individual vessel level) are strongly skewed by industrious captains working with proactive vessel coordinators.

- **The more experienced handline fishing vessel captains are likely to continue using PointTrek after the pilot project ends**. From the FGDs, it is apparent that the more active, experienced boats captains and fishing masters are more likely to understand and utilise the communication potential and data availability from the IDP PointTrek device and associated software.
- **The commitment of vessel skippers and crew to using PointTrek on a commercial basis in the short-trip pole and line fishery is less certain**. Whilst a number of vessels – especially those in the handline fishery in Benoa Bali and Lombok, have recognised the value of PointTrek in providing vessel security and improved fishing opportunities, others are less convinced. This is particularly the case in Larantuka and Maumere, where vessels tend to work alone, and thus benefit less from the leverage provided through SMS and information-based cooperation. They are also much more sensitive to their vessel location being available to both other fishers and the authorities and appear to be less beholden to vessel coordinators or processors. Looking at **Table 8,** it is evident that only one of the seven vessels in Maumere (*Gemala NTT 01*) ever used the SMS facility.
- **The equipment is largely robust**. The antenna, system unit and integral power supply have proven to be robust and reliable, even under extreme conditions. The weak point in the system are the Android tablets, which area easily broken and are sensitive to water damage.
- **There are currently no competing products with a similar cost and specification to the Inmarsat IDP Pointrek**. Whilst there are a number of electronic VMS solutions with a similar technical capability and price point to that of the Inmarsat IDP, there are no similar solutions that provide the SMS capability.

Table 7: SMS usage by individual pilot vessels over the project (Handline vessels)

Port / Vessel name	Percentage of SMS messages sent by vessel over each quarter for each port							
	Q4-17	Q1-18	Q2-18	Q3-18	Q4-18	Q1-19	Q2-19	Grand Total
Benoa Bali	**34.29%**	**25.56%**	**19.36%**	**38.84%**	**53.29%**	**21.24%**	**36.04%**	**33.66%**
Star Mild 12	26.44%	0.00%	44.47%	0.55%	19.14%	100.00%	56.73%	26.87%
Rizky Kumala 02	25.83%	0.00%	0.00%	19.47%	31.90%	0.00%	0.00%	17.49%
Raja Timur	3.26%	8.09%	39.46%	31.73%	0.28%	0.00%	0.00%	12.49%
Aisah 38	9.02%	75.00%	0.00%	2.52%	14.42%	0.00%	20.91%	11.14%
Purnama Sidi 18	9.77%	0.00%	4.59%	2.95%	23.02%	0.00%	0.00%	8.03%
Aisah 42	4.02%	16.91%	0.00%	23.41%	0.00%	0.00%	3.40%	7.26%
Setia Jaya 03	14.39%	0.00%	3.34%	8.42%	0.00%	0.00%	0.00%	6.61%
Usaha Baru 77	1.67%	0.00%	3.55%	8.97%	11.23%	0.00%	0.00%	4.72%
Harapan City 89	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	7.62%	1.10%
Star Mild 07	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	6.97%	1.00%
Setia Jaya 02	1.52%	0.00%	3.55%	0.11%	0.00%	0.00%	0.00%	0.89%
Bukit Mas 01	2.20%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.68%
Rizky Jaya 03	1.67%	0.00%	1.04%	0.11%	0.00%	0.00%	0.00%	0.65%
Adia Bali 27	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	4.38%	0.63%
Sinar Mentari 05	0.00%	0.00%	0.00%	1.75%	0.00%	0.00%	0.00%	0.37%
Harapan City 87	0.23%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.07%
Lombok Timur	**47.22%**	**55.83%**	**71.83%**	**39.99%**	**16.70%**	**6.64%**	**38.79%**	**45.21%**
Indraku	0.00%	0.00%	24.25%	35.18%	0.00%	0.00%	0.00%	13.25%
Akarni Jaya 07	6.55%	11.11%	14.91%	7.65%	1.77%	23.33%	0.00%	8.69%
Bara Jaya	3.91%	3.70%	16.94%	3.40%	32.74%	0.00%	0.00%	8.50%
Lappa Mas 04	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	63.40%	7.32%
Cinta Mekkah 05	7.37%	9.43%	6.81%	4.78%	30.53%	0.00%	1.36%	7.06%
Timur Laut 02	5.28%	2.36%	13.51%	0.00%	0.88%	0.00%	0.00%	6.00%
Cahaya Indah 03	11.61%	13.80%	0.00%	6.16%	0.00%	0.00%	0.00%	5.39%
Kurnia Illahi BL 01	0.00%	0.00%	13.28%	3.29%	0.88%	0.00%	0.00%	4.68%
Ryang 13	5.94%	10.77%	3.38%	2.66%	1.77%	0.00%	0.00%	3.98%
Cinta Mekkah 07	4.40%	10.77%	1.18%	3.61%	5.75%	3.33%	0.00%	3.15%
Mega Nusa 03	3.41%	1.01%	0.62%	8.29%	0.44%	0.00%	0.00%	2.69%
Berlian 02	5.06%	4.71%	0.00%	2.34%	0.00%	0.00%	0.00%	2.22%
Hasil Bersama 04	2.92%	1.68%	1.07%	0.00%	19.91%	3.33%	0.00%	2.14%
Erna Mandiri 002	3.03%	0.00%	0.23%	2.87%	4.87%	0.00%	0.30%	1.72%
Larossa 03	4.35%	6.40%	0.00%	0.00%	0.00%	0.00%	0.00%	1.70%
Teluk Bone 06	3.69%	0.00%	0.23%	2.87%	0.00%	0.00%	0.00%	1.70%
Berlian 01	2.64%	2.36%	0.00%	4.14%	0.00%	0.00%	0.00%	1.63%
Kurnia Illahi 02	4.90%	1.35%	0.00%	0.00%	0.00%	0.00%	0.00%	1.62%
Ryang 06	3.69%	8.75%	0.00%	0.00%	0.00%	0.00%	0.00%	1.62%
Terkabul 01	2.97%	0.67%	0.00%	3.93%	0.00%	0.00%	0.00%	1.62%
Putra Kembar BL 07	1.10%	0.00%	3.38%	0.00%	0.00%	0.00%	0.00%	1.39%
Arya Jaya 02	2.75%	5.72%	0.11%	0.00%	0.00%	0.00%	0.00%	1.20%
Subaedah	0.55%	0.00%	0.00%	5.95%	0.00%	0.00%	0.00%	1.15%
Lappa Mas 02	0.00%	0.00%	0.00%	0.00%	0.00%	26.67%	8.43%	1.11%
Cinta Mekkah 03	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	8.28%	0.96%
Cinta Mekkah 08	0.00%	0.00%	0.00%	0.00%	0.00%	43.33%	6.33%	0.96%
Al Faiz	2.92%	0.00%	0.00%	0.00%	0.44%	0.00%	0.00%	0.94%
Panther Laut 83	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	7.38%	0.85%
Sampoerna 02	2.42%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.76%
Jefri 01	0.06%	4.38%	0.00%	2.87%	0.00%	0.00%	0.00%	0.71%
Rahma Abadi 04	2.09%	0.00%	0.11%	0.00%	0.00%	0.00%	0.00%	0.70%
Cinta Mekkah 06	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	4.52%	0.52%
Az Zahra 04	1.32%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.42%
Air Zam Zam	1.21%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.38%
Versace 14	0.88%	0.67%	0.00%	0.00%	0.00%	0.00%	0.00%	0.31%
Adidas 01	0.88%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.28%
Versace 04	0.77%	0.34%	0.00%	0.00%	0.00%	0.00%	0.00%	0.26%
Versace 10	0.83%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.26%
Purnama Sidi 54	0.50%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.16%
Rizki Bersama 01	0.06%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.02%

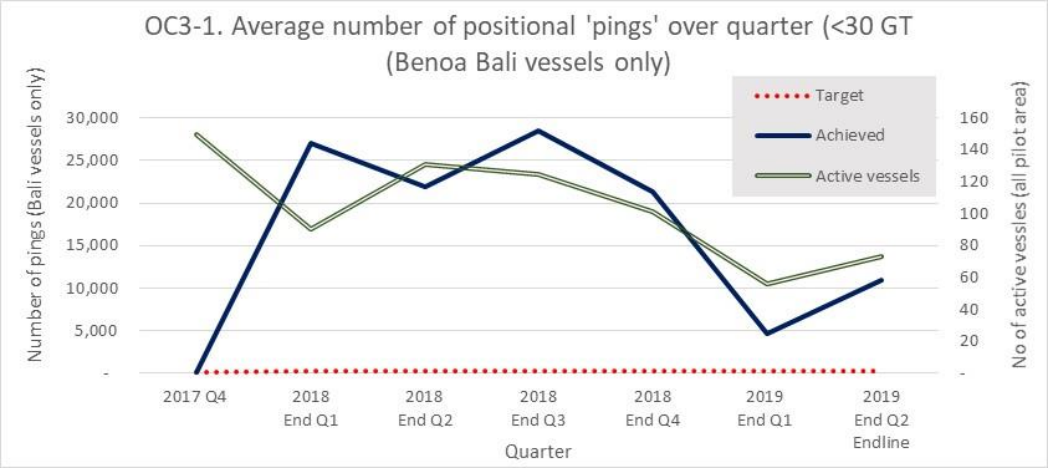
Table 8: SMS usage by individual pilot vessels over the project (Pole & Line vessels)

Port / Vessel name	Percentage of SMS messages sent by vessel over each quarter for each port							
	Q4-17	Q1-18	Q2-18	Q3-18	Q4-18	Q1-19	Q2-19	Grand Total
Larantuka	**15.35%**	**13.72%**	**8.61%**	**20.91%**	**28.75%**	**71.90%**	**25.12%**	**19.75%**
Flotim 24	23.18%	10.96%	28.17%	20.33%	40.10%	20.92%	23.49%	25.07%
Flotim 25	3.38%	0.00%	27.23%	29.07%	2.06%	10.46%	24.65%	14.68%
Flotim 07	1.35%	4.11%	0.00%	20.33%	16.20%	32.00%	14.88%	13.61%
Flotim 21	26.06%	15.07%	8.92%	3.86%	9.25%	0.00%	3.95%	10.19%
Cinta Bahari	21.49%	58.90%	3.76%	0.61%	4.63%	1.85%	4.65%	8.95%
Inka Mina 440	0.17%	10.96%	7.04%	1.63%	9.00%	13.85%	18.14%	7.56%
Flotim 9	1.52%	0.00%	6.10%	9.96%	5.14%	9.85%	0.00%	4.89%
Shakira	1.86%	0.00%	3.76%	0.20%	9.51%	10.77%	5.35%	4.58%
Bahtera Flotim 2-13	13.37%	0.00%	7.51%	0.61%	0.00%	0.00%	0.00%	3.90%
Anugrah Mina 09	5.75%	0.00%	4.23%	6.50%	1.29%	0.00%	0.00%	3.18%
Flotim 22	0.00%	0.00%	3.29%	4.67%	2.83%	0.31%	2.09%	2.03%
Nelayan Bakti 40	1.86%	0.00%	0.00%	1.63%	0.00%	0.00%	0.00%	0.76%
Flotim 09	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	2.79%	0.48%
Flotim 06	0.00%	0.00%	0.00%	0.41%	0.00%	0.00%	0.00%	0.08%
Flotim 33	0.00%	0.00%	0.00%	0.20%	0.00%	0.00%	0.00%	0.04%
Flotim 12B	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Maumere	**3.14%**	**4.89%**	**0.20%**	**0.25%**	**1.26%**	**0.22%**	**0.06%**	**1.39%**
Gemala-NTT 01	57.02%	73.08%	40.00%	100.00%	100.00%	100.00%	100.00%	64.97%
Indah Baitullah	15.70%	26.92%	60.00%	0.00%	0.00%	0.00%	0.00%	16.38%
Surya Mas	9.09%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	6.21%
KCBS 11	6.61%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	4.52%
KCBS 15	4.96%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	3.39%
Rahmat Illahi	4.13%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	2.82%
Sinar Surya	2.48%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	1.69%

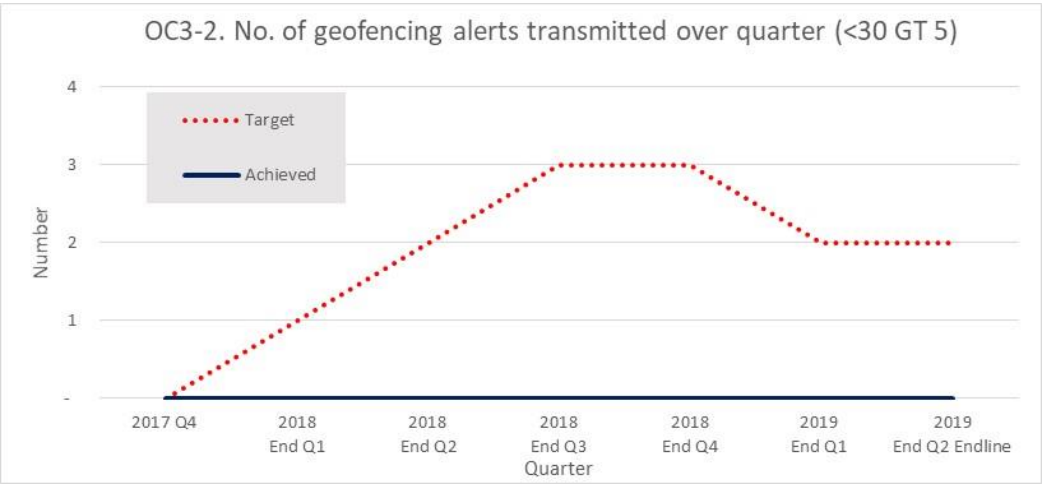
6.3 Outcome 3: Levels of IUU fishing reduced through targeted monitoring, control & surveillance from the use of satellite-based communication and VMS technology

Figure 8: Outcome 3 Indicator Results (by quarter)

OC3-1



OC2-2



6.3.1 Relevance

- **At present there is no official regulation that requires approved VMS to be installed on vessels < 30 GT**. This has a number of implications for the use of VMS data by PSDKP, including (i) it has lower priority than their monitoring of vessels >30 GT and (ii) VMS evidence is not admissible in courts if < 30 GT boats are prosecuted. It is understood that whilst KKP are actively considering a lowering of the VMS threshold to below 30 GT, no detailed plans or impact analyses have yet been conducted. It is also understood that the results of this pilot project – and in particular the cost-earnings analysis – will be important evidence to inform this decision-making process (PSDKP, pers. comm., 24 July 2019).
- **There are no major IUU issues known to be associated with the <30 GT fleets**. The handline fisheries work mainly on anchored FADs in coastal waters within 200 nm of their home port. The pole and line fisheries are restricted by short trips and bait collection, so generally work within 80 nm of land at the most. The most likely infringements are mis-reporting of catch from one FMA to another, most of which is likely to be accidental rather than deliberate. This point was confirmed by PSDKP at the Endline Workshop on 1 August 2019.

- Related to the last point above, **for vessels < 30 GT PSDKP are mainly focused on cross-checking the fishing areas reported in landing reports with historical VMS data, rather than monitoring live fishing activity**.

6.3.2 Effectiveness

- **The pilot fleet of 203 active <30 GT vessels are now transmitting VMS data on their position, speed and track for the first time in Indonesia**. Until this project, to our understanding no vessels < 30 GT have been equipped with, nor have used, VMS equipment in Indonesia. Whilst it is recognised that this is not currently required by law in Indonesia, it will allow the Indonesian control authorities additional data to monitor these commercially important fishing fleets. At project closure, around 78 of the 203 vessels currently contracted to use the equipment were still active (see **Figure 5** on page 25). This will be further assessed at the Legacy Evaluation.
- **Power issues and the deliberate disabling of VMS transmissions need to be addressed.** There are genuine issues over the inadequate power supply for re-charging the integral batteries on the IDP PointTrek units, especially on the handline vessels where trips of over 10 days are usually made. The DC converter, and the use of solar panel trickle chargers have assisted, but not fully addressed the issue, which stems both from the small size of the vessels (and therefore on-board power generating capacity is limited) and their age (and thus poor condition of the lead-acid main batteries). A separate issue is the ability for vessel operators to disconnect or disable the IDP equipment for their own end, either to 'hide' the vessel from both private and public sector view or to reduce power consumption. It is assumed that most of the pole & line vessels – which have short 2-3 day trips - which go 'dark' are deliberately switching the equipment off as they should have adequate internal battery power for these short trips. The FGDs confirm that most of these vessels are highly competitive and do not like anyone – not even their vessel coordinators – seeing where they fish.
- **A geofencing capability has now been introduced to ensure vessels are complying with their geographical license conditions.** The geo-fencing allows an alarm to be raised if the vessel strays beyond its licensed waters, or if they move into marine protected areas. The system is primarily for fishing vessel use e.g. to warn them if they cross such boundaries but can also be used by the control authorities, if necessary. For the latter, it is important that the Fisheries Monitoring Centre operators have the training to distinguish tracks that are simply transiting unlicensed areas, rather than actually fishing there.
- **The 'Phinisi' VMS software is now being installed in the Fisheries Monitoring Centres (FMCs) in Jakarta MMAF and the UPS**. The *Phinisi* VMS analysis software was installed in the FMCs in Jakarta and Benoa Bali in June 2018 and staff trained in its use. Preliminary feedback is generally positive, although it does need improvement, especially to enable the tracking of vessel movements at a fine level of detail (i.e. zoom facility and clarity on screen).
- **To date, there has only been a limited use of <30 GT VMS data by PSDKP to reduce IUU fishing**. The *Phinisi* equipment was initially used for about 30 minutes each day in Bali to track vessel position together with heat map features. Most of its use is for the cross-checking of landing reports (which declare where the fish was caught) with historical vessel track data. However use since that date has been very limited, and the system in Benoa Bali and East Lombok have been offline for the last four months from April 2019 to the ELE site visit at the end of July 2019, apparently due to a server change.

6.3.3 Impact

- **VMS data has proved useful when cross-checking landing reports with declared fishing areas.** As stated above, pilot project VMS data is already being used to cross-check the validity of landing reports and their declared fishing areas. This information was not available before the pilot project and addresses one of the potential IUU risks in these fisheries.
- **Jurisdictional and legislative constraints are preventing VMS data from being used to deter <30 GT vessels suspected of IUU behaviour**. One major constraint to the use of VMS information in combatting IUU behaviour in these fisheries is that VMS evidence is not admissible in a court of law, as it is not yet covered by the relevant statute books. Furthermore, the lack of legislation on the use of VMS in vessels < 30 GT means that government authorities are discouraged from using VMS data in monitoring these vessels. However VMS information can be used to support internal risk assessment and to focus traditional control resources on recurrent suspicious behaviour.
- **Pilot vessels are unwilling to report suspected IUU behaviour to the authorities**. The FGDs suggested that vessel captains are very reluctant to report IUU behaviour by other vessels to the authorities. This is supported by the SMS message analysis, where only 64 message out of over 12,726 included such information. The main barriers are a fear of both involvement in any subsequent administrative processes, as well as hostile actions from the suspect vessel.

6.3.4 Sustainability

- **The new Phinisi VMS software is proving popular but still needs improvements, especially to allow high resolution vessel tracking**. From the experience of using the VMS equipment to date, the new VMS data interface is liked as it is mainly 'bug-free' (unlike that for the >30 GT software currently used[16]) and user friendly. It does need further development, including poor vessel track resolution when the internet speed is low or when the system is zoomed to maximum magnification. It is difficult to see detail if double tracking occurs (e.g. two boats together for purse nets or transhipment purposes).
- **However there is a risk that pilot vessels may switch off the VMS function after project funding ceases**. Under the current agreement with pilot vessels there are potential penalties (e.g. removal of the equipment) if the VMS function is switched off for long periods. This threat will be removed after the pilot project ceases, unless new legislation is introduced that enforces VMS use in fishing vessels < 30 GT. At the end of the pilot trial, 73 of the original 200 vessels were still using the VMS equipment at least once over the past quarter. **Based on the number of vessels using the VMS+ equipment over the last project quarter (Q2-19), around 15 (*c*. 8%) of the fleet may continue purchasing airtime now the free allowance is no longer available**. This will be tested in the Legacy Evaluation.
- **This system would allow the rapid enforcement of IUU fishing should legislation be introduced mandating the use of VMS equipment of vessels 10-30 GT.** As mentioned above, should legislation be introduced that either allows the use of VMS data in supporting fisheries control case work or its use in criminal courts, this tool would become a critical tool in fisheries-related enforcement.

[16] Although WebTrack application has a regular issue of "hanging" when internets speeds are poor

6.4 Outcome 4: Improved capacity to plan and implement monitoring, control and surveillance (MCS) within the national and local government

6.4.1 Relevance

- **PSDKP remains responsible for ensuring the compliance of 10 - 30 GT fishing vessels at both national and regional levels**. Whilst KKP has delegated its authority of issuing SIUP, SIPI, and SIKPI licensing authorisations to local government units, PSDKP remains the main authority for ensuring the compliance of vessels > 10 GT, especially at sea. The FGD in Larantuka suggests that PSDKP, the Marine Police and the navy all share surveillance within 12 nm, with the navy taking primacy in the 12-200 nm zone.
- **Discussions with PSDKP at UPT and SATWAS levels reinforce the need for effective MCS capacity at regional level, especially for vessels 10-30 GT**. Again the FGDs suggest that the perceived good compliance levels of the two pilot vessel fleets mean that they are not considered a high IUU risk. Therefore they are not a focus of MCS operations, and there is limited operational capability in locating and investigating suspect vessels in this vessel class. It will therefore be a challenge to develop surveillance technologies for <30 GT vessels using VMS alone, as (i) they are not worth the cost of investing expensive satellite-based radar analysis and (ii) these vessels rarely use AIS. As a result, PSDKP will need to invest in new processes and Standard Operating Procedures (SOPs) for analysing and asset tasking for vessels < 30 GT.
- **Around 30 (of the 50) pilot vessels in Larantuka are owned by the government, thus posing a possible conflict of interest over vessel monitoring, control and surveillance**. It is understood that these vessels were originally owned by the government and being transferred to the private sector through a lease back scheme. However, again anecdotally, it is understood that in most cases few if any of the vessels have been paid off, so they are essentially owned by the government, but operated by the private sector vessel coordinator who is the *de facto* vessel owner (and receives the vessel owner's catch share). This may partially explain the reluctance of vessels to share their position and fishing success with other vessels, although is likely to be of minor consequence due to their short trips and individual nature of fishing operations. In addition, the MCS authorities may be reluctant to target and if necessary, prosecute fishing vessels where their ownership is still formally in government hands.
- **Whilst the relevance of PSDKP ensuring the compliance of vessels <30 GT is uncontested (see above), it is recognised that this is not a capacity-development project.** The purpose of this project was to test whether the Inmarsat VMS+ could (i) increase the safety of fishers at sea and improve the efficiency of their fishing operations, and so improve their livelihoods and (ii) provide PSDKP with spatial tracking data for these smaller vessels, as well as opening the potential for e-reporting (e.g. via e-logbooks). Whilst there was some technical training in the use of *Phinisi*, there were no work packages aimed at improving the capacity of PSDKP to use this data e.g. for IUU risk analysis for vessels <30 GT or developing associated Standard Operating Procedures on how VMS-based evidence might be used to prosecute detected infringements. Indeed, whilst the policy environment precludes any legal mandate for using VMS on vessels <30 GT (see Outcome 5), this would have been pointless.

6.4.2 Effectiveness

- **Checking and enforcing the compliance of 6 - 30 GT vessels is a relatively low priority for PSDKP and has thus receives less planning and operational time**. There is limited MCS planning for the <30 GT fleet, such as inclusion in MCS plans, Standard Operating Procedures or MoUs with other government authorities (e.g. the navy, coastguard or Marine Police). Again the FGDs suggest that the perceived good compliance levels of the two pilot vessel fleets mean that they are not considered a high IUU risk. Therefore they are not a focus of MCS operations, and there is limited operational capability in locating and investigating suspect vessels in this vessel class.
- **Whilst there is some formal cooperation between Government agencies combatting IUU, there is only limited joint planning and operations associated with vessels 6-3 GT at present**. The FGDs suggested that, within the 12 nm coastal zone, PSDKP, the Marine Police, the coast guard (BAKAMLA) and the navy work together on an *ad hoc* basis. There is some level of coordination e.g. informal un-minuted monthly meetings at a local level, but no formal cooperation or joint operations.
- **It is difficult for PSDKP to respond to suspected IUU activity for vessels < 30 GT due to their limited legislative mandate**. Vessels 10-30 GT require some form of 'vessel monitoring system' but do not require an electronic VMS that reports information to the control authorities. As a result VMS data from the pilot project cannot be formally used in any case against suspected IUU incidents.
- **BASARNAS has not yet been provided access to the VMS data which could potentially assist with their SAR operations**. BASARNAS, the government authority mandated with the search and rescue function in Indonesia, does not currently have access to the PointTrek data, either at their land-based stations nor on their mobile assets. In the event where a pilot vessel presses the 'mayday' button (or declares a Mayday via SMS), either SISFO or the vessel coordinator will contact BASARNAS by telephone and providing position / situational information manually. There is a case therefore for a more joined up approach to both alerting BASARNAS in the case of an emergency and providing electronic access to the vessels last / current VMS transmissions over the course of the emergency response.

6.4.3 Impact

- **At this endpoint, there has been no real change in the way <30 GT vessels are controlled in the pilot FMAs**. To our knowledge, no action has been taken against any pilot vessel as a result of VMS or other data derived from the PointTrek IDP system. Our understanding, based upon FGDs and meetings with the control authorities, is that the high level of compliance, together with the lack of formal backing for the use of VMS data in managing <30 GT vessels, is the main reason for this.

- **There is a need to improve the capacity of PSDKP, especially at UPT and SATWAS levels, to interpret VMS data to assist in combatting IUU fishing under their jurisdiction**. Although both UPTs and SATWAS' have had access to >30 GT VMS data for some time, the poor quality of data access via the current PSDKP FMC system means that very limited real time vessel behaviour analysis is conducted at UPT level. Instead PSDKP focusses on verifying logbook and other catch reporting using historical VMS records e.g. to see if a vessel was fishing in a certain location when it said it was. Now the *Phinisi* FMC is available at UPT Benoa Bali (it has not been installed in the Larantuka or Lombok SATWAS offices at the time of the MLE). As a result, both UPT and SATWAS staff have very little experience using VMS in real time to identify and analyse vessel behaviour[17] and thus task patrol vessel and other assets in IUU interdictions.

6.4.4 Sustainability

- **At present there is insufficient institutional capacity at regional and UPT levels to fully utilise VMS and other digital data. This includes (i) VMS vessel position feeds, (ii) e-logbook data and (iii) electronic administrative submissions e.g. SIPI**. Until this project the UPTs and SATWAS offices have made little real-time operational use of VMS, apart from the cross-checking of historical VMS data with landing declarations. This is because the legal mandate for using VMS data mostly lies with PSDKP in Jakarta, as does the responsibility for real-time tasking of operational assets such as patrol boats. This said, the capability does exist within PSDKP as a whole, and this could be developed at regional and UPT levels if required. However it may need a change in legislation e.g. to bring the electronic VMS threshold down to 10 GT in order to stimulate this.

[17] See Marzuki, M. I., R. Garello, R. Fablet, V. Kerbaol & P. Gaspar (2015). Fishing Gear Recognition from VMS data to Identify Illegal Fishing Activities in Indonesia. IEEE, 2015

6.5 Outcome 5: Policy environment for the use of satellite-based vessel monitoring systems for regulating <30 GT fishing vessels established

This forward looking outcome was based on the premise that a policy environment conducive to the use of VMS systems for fishing vessels <30 GT might be developed by the end of the project, either in the form of a full regulation or as a temporary mandate to use VMS data in combatting IUU fishing in the pilot fleet, even if any VMS-related evidence was inadmissible in court.

At the time of the ELE (early August 2019) there is no such regulation nor temporary mandate in place. A temporary mandate may have been possible, but it is likely that the initially limited support from KKP for the <30 GT pilot, followed by the vacant DG post in PSDKP in Jakarta, prevent this proactive approach being taken.

This said, the evaluation team consider there to be a shift in PSDKP thinking to be more supportive of lowering the VMS threshold. During discussions over the endline mission, and in particular at the Endline Workshop (see **Appendix G** for workshop minutes) the PSDKP regularly expressed their interest in lowering the threshold to either 20 or even 10 GT. However there are a number of barriers to this that need to be further explored, including:

1. **The affordability of installing, operating and maintaining a VMS system in vessels <30 GT**. PSDKP are understandably sensitive to resistance to the cost of installing, operating and maintaining VMS equipment by smaller vessels who do not necessarily have the cash flow and operating margins to afford these costs. Indeed, it is this affordability element which will set the lower threshold for any new regulation. The results of the cost-earnings component of this M&E programme will provide useful evidence to PSDKP on how VMS+ equipment – if competently used – can offset the costs involved. However it is recognised that these cost savings may be specific to certain fleets e.g. the high-value tuna fisheries and may not necessarily be realised with lower-value fisheries e.g. for small pelagics, esp. for local markets.
2. **Lowering the VMS GT threshold will have considerable consequences for PSDKP's capacity, both in Jakarta and the regions.** When speaking to the UPT in Benoa Bali and the UPTs in Lombok and Larantuka, we were regularly told that there was a shortage of trained staff to undertaken MCS functions of vessels < 30 GT.
3. **Jurisdictional boundaries with DKP.** The licensing of vessels <30 GT lies within the jurisdiction of the Provincial government authorities. Therefore any move to introducing VMS on vessels <30 GT will require careful consultation and coordination with these bodies to both ensure that no jurisdictional conflicts were unwittingly created and to maximise data exchange e.g. on license information to ensure that the use of VMS data is both effective and efficient.

Finally it should be noted that Hatfield and Marine Change are updating their policy paper, which will include detailed cost-benefit and business case analyses, for the end of September 2019. This will include an examination of the M&E cost-earnings results at the endline stage and will no doubt be examining the issues raised above.

7. Quantitative measurements of each Log Frame Indicator

The current, revised Log Frame (v 9-1) can be found in **Appendix A**. The key findings (for Impacts and Outcomes) and are as follows:

7.1.1 Impacts

Impact 1: The safety, productivity and food security of Indonesian fishers and their communities enhanced through the expansion and adoption of VMS.

Around 73 vessels (36% of the pilot fleet) were still using the VMS+ equipment over the last quarter of the project (e.g. active pings detected, see **Figure 5** on page 25), although only 24 of these (12% of the pilot fleet) were using the SMS facility. This is disappointing, given that installation and airtime was free. Furthermore only four additional Pointrek units have been installed in the pilot FMAs, and none outside, which is a fraction of the targets considered to be realistic by SISFO at the project inception.

Impact Indicators (II) 1 (2021 target)		2017 *Q4*	2018 (end Q2)	2018 (end Q4)	2019 (Q2, endline)
II1-1. % of original pilot fishing vessels in Pilot FMAs still using satellite-based services / VMS in 2021 (<30 GT 75%)	**Planned**	No target	No target	No target	No target
	Achieved	75%	66%	51%	37%
II1-2. No. of additional fishing vessels (20-30 GT) in pilot FMAs using satellite-based services / VMS in 2021 (<30 GT 500)	**Planned**	Zero	100	250	400
	Achieved	Zero	0	0	4
II1-3. No. of additional fishing vessels (20-30 GT) in additional FMAs w ith satellite-based services / VMS in 2021 (<30 GT 200)	**Planned**	Zero	20	100	-
	Achieved	Zero	0	0	
II1-4a.Accumulated total additional vessel earning per trip for all vessels in pilot fleets from Lombok and Larantuka (total net benefit) from April 2018 to date compared to Control boats (GBP)	**Location**	Lombok / L'tuka	Lombok / L'tuka	Lombok / L'tuka	Lombok / L'tuka
	Planned	5%	5%	5%	5%
	Achieved	Zero	£16,567 / £22,630	No data / No data	£122,347 / £127,778
II1-4b. Accumulated total additional incremental average vessel earning per trip for all vessels in pilot fleets estimated from all pilot boats (Lombok, Benoa, Larantuka and Maurere from January 2018 to June 2019 (18 months) compared to Control boats (GBP).					£418,518
II1-5. No. of lives saved through use of satellite-based services / VMS (<30 GT 1 per annum)	**Planned**	1	1	1	1
	Achieved	6	20	17	0

On a more positive note, from June 2018 to June 2019 it is estimated that the accumulated incremental net income by pilot fleet / harbour is £418,518 over this period (see II1-4 above and Table 9 below for more details).

Table 9: Accumulated Incremental Net Income by pilot fleet/harbour (Jan 2018 - June 2019)

Site	Fishery	No. of boats	Total incremental value (IDR)	Total incremental value (GBP)
Lombok	Handline	85	2,518,487,539	£146,816
Benoa		49	1,451,833,740	£84,635
Larantuka	Pole & Line	50	2,630,279,705	£153,333
Maumere		11	578,661,535	£33,733
Total		**195**	**7,179,262,520**	**£418,518**

It is estimated that around 39 lives have been saved (see II1-5) since project inception (a figure unchanged since the MTE), based upon crew rescued from vessels that have sunk or would have been otherwise lost.

Impact 2: The effectiveness of monitoring & enforcement efforts by the authorities improved through technology & process improvements.

To date there is no suggestions of any impact on KKP's ability to combat IUU fishing as demonstrated by the lack of additional FMAs using VMS data for < 30 GT vessels and the absence of formal joint MCS initiatives between central KKP and Provincial / District-level authorities (UPTs and DKP). The reasons for this are well covered in **Section 6** of this report.

Impact Indicators (II) 2 (2021 target)		2017 *Q4*	2018 (end Q2)	2019 (end Q2)	2019 (Q3, endline)
II2-1. No. of additional FMAs / RFMC / UPTs utilizing VMS data for fisheries MCS in vessels between 20-30 GT (6 FMAs).	**Planned**	None planned	None planned	3	3
	Achieved			-	-
II2-2. No. of formal joint MCS initiatives between central KKP and Provincial / District-level authorities (UPTs and DKP) formally implemented annually by 2021 (4)	**Planned**	None planned	None planned	None planned	4
	Achieved				

7.1.2 Outcomes

Outcome 1: Safety and security of mid-sized vessels (20-30GT) and larger (30 GT+) fishing vessels improved using satellite-based communication and VMS technology.

The targets for this outcome have consistently been met and often exceeded. It is evident that the use of SMS communication has made the sea a much safer place, both in terms of communicating with land where emergencies occur, as well as allowing decisions to safeguard vessels and crew through advance information on adverse weather conditions.

Outcome Indicators (OC) 1 (2019 target)		2017 *Q4*	2018 *End Q1*	2018 *End Q2*	2018 *End Q3*	2018 *End Q4*	2019 *End Q1*	2019 *End Q2 Endline*
OC1-1. No. of SMS message declarations for assistance (#2) transmitted (out) by pilot vessels over quarter by port (<30 GT 10)	**Planned**	5	3	5	5	5	3	5
	Achieved	81	8	15	26	5	3	2
OC1-2. No. of emergency SOS signals (panic button or message) (#1) transmitted by pilot vessels over quarter (<30 GT 2)	**Planned**	1	1	-	2	2	2	2
	Achieved	4	-	-	5	-	-	-
OC1-3. No. of formal actions taken to respond to emergency SOS messages received from pilot vessels over quarter (<30 GT 2)	**Planned**	1	1	1	2	2	2	2
	Achieved	2	-	1	-	-	-	-
OC1-4. No. of decisions (e.g. stop fishing, heave to, seek shelter, etc.) made to safeguard vessel and crew resulting from weather information (#3) received over quarter (<30 GT 400)	**Planned**	25	15	25	25	25	15	25
	Achieved	39	18	78	59	28	9	33

Outcome 2: Welfare and livelihoods of fishers and their dependents improved using satellite-based communication and VMS technology.

The SMS-based indicators (OC2-1, OC2-2, OC2-3, OC2-4) all show the pilot project meeting or exceeding their targets. Vessels are consistently buying additional SMS data packages, are using SMS communication to fine tune fishing opportunities and markets and are using SMS communications to improve logistical arrangements.

For those indicators based on the catch-earnings analysis, see **Section 6.2** for the results to date (further details are also available in **Appendix D: Cost Earnings Methodology and Results**.

Outcome Indicators (OC) 2 (2019 target)		2017 *Q4*	2018 *End Q1*	2018 *End Q2*		2018 *End Q3*		2018 *End Q4*		2019 *End Q1*		2019 *End Q2 Endline*	
OC2-1. Number of additional SMS data packages (of 50) purchased over period by pilot vessels (<30 GT 3)	**Planned**	1	1	2		2		2		3		3	
	Achieved	21	5	14		18		15		-		4	
OC2-2. No. of SMS messages transmitted / received by fishing boats relating to fishing opportunities (#6) (<30 GT 20)	**Planned**			150		150		150		150		150	
	Achieved			296		164		223		35		145	
OC2-3. No. of SMS messages transmitted / received by fishing boats (#8) relating to sales / market opportunities (<30 GT 20)	**Planned**			150		150		150		150		150	
	Achieved			185		207		140		87		123	
OC2-4. No. of SMS messages transmitted / received by fishing boats (#9) relating to logistics (ice, bait, victuals) (<30 GT 20)	**Planned**			50		150		150		150		150	
	Achieved			101		141		144		737		89	
OC2-5. Sentinel pilot vessels have a higher catch volume per fishing trip against controls in Lombok & Larantuka (Kgs/trip)	**Location**			Lombok	L'tuka	Lombok	L'tuka	Lombok	L'tuka	Lombok	L'tuka	Lombok	L'tuka
	Planned	2%	2%	No targets									
	Achieved	12%	<0%	521	100	-303	304	-86	-16	-365	22	425	-312
OC2-6. Sentinel pilot vessels have a higher gross margin per fishing trip against controls in Lombok & Larantuka (incremental gross income per trip in GBP)	**Location**			Lombok	L'tuka	Lombok	L'tuka	Lombok	L'tuka	Lombok	L'tuka	Lombok	L'tuka
	Planned	2%	2%	No targets									
	Achieved	12%	<0%	£91	£4	-£1	£278	-£150	-£67	£65.92	£30.91	£361	-£267
OC2-7. Sentinel pilot vessels have increased fish catch share income per crew member per day at sea against controls in Lombok & Larantuka (incremental income per crew member per day at sea/ GBP)	**Location**			Lombok	L'tuka	Lombok	L'tuka	Lombok	L'tuka	Lombok	L'tuka	Lombok	L'tuka
	Planned	2%	2%	No targets									
	Achieved	12%	<0%	£0.44	£2.27	£0.03	£5.83	-£1.24	-£1.39	£0.29	-£1.77	£0.71	-£1.55
OC2-8.Sentinel pilot vessels have reduced time at sea against controls in Lombok & Larantuka (days less per trip). Note: positive number indicates less time at sea and negative indicators more time at sea	**Location**			Lombok	L'tuka	Lombok	L'tuka	Lombok	L'tuka	Lombok	L'tuka	Lombok	L'tuka
	Planned	2%	2%	No targets									
	Achieved	12%	<0%	0.7	-0.8	-0.9	-0.3	-3.8	-0.04	2.1	0.13	1.84	-0.33
OC2-9. Sentinel pilot vessels have reduced fuel usage per trip against controls in Lombok & Larantuka (Less Cans of fuel used per trip): Note - negative number indicates more fuel cans used by sentinel compared to control	**Location**			Lombok	L'tuka	Lombok	L'tuka	Lombok	L'tuka	Lombok	L'tuka	Lombok	L'tuka
	Planned	2%	2%	No targets									
	Achieved	12%	<0%	-0.58	-0.93	0.13	-1.02	-1.76	0.72	4.10	0.28	0.03	0.76
OC2-10. No. of pilot vessels utilising electronic logbook systems (e.g. data exchange) over quarter (<30 GT 20)	**Planned**	-	2	5		10		15		20		20	
	Achieved	-	-	96		23		23		-		-	

Outcome 3: Levels of IUU fishing (with client fleet) reduced through targeted monitoring, control and surveillance (MCS) resulting from the use of satellite-based communication and VMS technology.

Pointrek will provide vessel positioning data via the VMS. It was assumed that as the pilot project progresses, the amount of this data (e.g. the number of pings transmitted by each boat) will increase as the demand for positional data from both compliance authorities increases e.g. for IUU certification requirements. This seems to be the case, although the number understandably dropped during the low fishing season in the first quarter (Q1) of both 2018 and 2019. Otherwise the outcomes are less certain. The geofencing has become operational but has not been utilised to date. It was also anticipated that fishers would use the SMS facility to report suspected IUU behaviour by other vessels. This has not really occurred, with the FGDs suggesting that a fear of recrimination from the accused vessels have prevented them from doing so.

Outcome Indicators (OC) 3 (2019 target)		2017 *Q4*	2018 *End Q1*	2018 *End Q2*	2018 *End Q3 MTR*	2018 *End Q4*	2019 *End Q1*	2019 *End Q2 Endline*
OC3-1. Average number of positional 'pings' over quarter (<30 GT (Benoa Bali vessels only)	**Planned**	100	200	225	300	300	300	300
	Achieved	172	27,007	21,861	28,559	21,279	4,728	10,926
OC3-2. No. of geofencing alerts transmitted over quarter (<30 GT 5)	**Planned**	n/a	1	2	3	3	2	2
	Achieved	n/a	-	-	-	-	-	-
OC3-3. No. of reported observations of IUU events by third parties encountered by pilot vessels (#7) per quarter (<30 GT 5)	**Planned**	Zero	2	3	4	4	5	5
	Achieved	Zero	0	1	0	0	-	-

Outcome 4: Improved capacity to plan and implement monitoring, control and surveillance (MCS) within the national and local government.

This outcome has not been achieved to date. Whilst the *Phinisi* FMC software has been installed in the Benoa Bali UPT and is being used (see Indicator OC4-2), the lack of jurisdictional and legal powers to formally use the new information for <30 GT vessels has meant that no actions have been taken against non-compliant vessels (indictor OC4-1). Furthermore the system has been inaccessible for the last four months (April 2019 to endline mission in late July 2019) due to a server change.

Outcome Indicators (OC) 4 (2019 target)		2017 *Q4*	2018 *End Q1*	2018 *End Q2*	2018 *End Q3 MTR*	2018 *End Q4*	2019 *End Q1*	2019 *End Q2 Endline*
OC4-1. No. of actions taken against potentially non-compliant pilot vessels (<30 GT)	**Planned**	None planned	None planned	No target	No target	No target	No target	No target
	Achieved			PSDKP staff trained but VMS app' not used	PSDKP staff trained but VMS app' not used	PSDKP staff trained but VMS app' not used	PSDKP staff trained but VMS app' not used	PSDKP staff trained but VMS app' not used
OC4-2. No. of Phinisi log in events by UPT Benoa Bali & SATWAS Larantuka per quarter	**Planned**	None planned	None planned	No target	No target	No target	No target	No target
	Achieved			61 (37 vessels)	No data available	-	21	16

Outcome 5: Policy environment for the use of satellite-based vessel monitoring systems for regulating <30 GT fishing vessels established.

See **Section 6.5** on page 46

7.1.3 Outputs

Output 1: By March 2018 VMS installed in 200 < 30 GT boats-includes satellite communications terminals, communications hub, back up battery, & user interface tablet (1.1) and 200 fishing boat crews trained in the use.

To date 217 vessels had had the PointTrek IDP VMS+ system installed, and crew trained, thus exceeding the target. Currently 197 are active, 18 decommissioned and one vessel has been lost. Of those that are active, around 24 are still using the SMS facility.

Output 2: By February 2019, human-centred design (HCD) insights into user incentives ready for adoption for future VMS programmes .

Three workshops were held over Q1-2018 and the final work package (DI360.4: Design guide outlining key service update recommendations before wider commercial roll-out) delivered in March 2019.

Output 3: By Dec 2018 a commercial model produced to demonstrate the feasibility and sustainability pathways.

The commercial model for the <30 GT package is due to be delivered at the end of September 2019.

Output 4: By Dec 2018, two policy briefs developed and disseminated to inform legislative process around best practices.

Two policy briefs have been delivered (in Q2 2018). These will be reviewed and updated by September 2019.

Output 5: By March 2019, three workshops held to present pilot project findings and successes.

At least one project workshop has been held to date (excluding the three M&E workshops) and to further workshops are scheduled over September 2019.

8. Conclusions, Lessons & Recommendations

8.1 Conclusions from the Process Evaluation

8.1.1 Relevance

The purpose of this project was to test whether the Inmarsat VMS+ could (i) increase the safety of fishers at sea and improve the efficiency of their fishing operations, and so improve their livelihoods and (ii) provide PSDKP with spatial tracking data for these smaller vessels, as well as opening the potential for e-reporting (e.g. via e-logbooks). In terms of the fishers, the project made good contacts with vessel operators, coordinators and the dependent supply chain e.g. fish processors receiving fish from pilot vessels. However in terms of the engagement with PSDKP, both at central and regional levels, there are lessons to be learned. This is explored more below.

One of the project's impacts (Impact 2) is that "*The effectiveness of monitoring & enforcement efforts by the authorities improved through technology and process improvements. By 2021 improvements to fisheries management & legislation, experience gained and lessons learnt from the project leads to an increase in local demand for an expanded platform in Indonesia for satellite assisted MCS with the result that MCS technology and processes are developed and adopted in other FMAs*". This was based on the premise that the introduction of VMS+ technology to the <30 GT vessel class would result in a change in policy and regulation to allow satellite-based monitoring, control and surveillance (MCS) of these smaller boats. This still might be achievable in 2021 as it has allowed a business case to be developed and the technology proven. However there was a chance to take this one stage further by developing PSDKP's capacity to use information derived from the VMS system to improve their MCS capability. Although the technology to do so was provide under the project (e.g. *Phinisi* access provided in both Jakarta, as well as at UPT and SATWAS levels), **there was no accompanying capacity-development support for its integration into recurrent MCS activities**. As a result the *Phinisi* system has been essentially left unused since it was installed in mid-2018.

There are good reasons for this. No budget was earmarked for KKP use nor any provision for counterpart funds from the KKP defined for specific activities that would instil a degree of project ownership. The KKP had a limited role / responsibility in design and in project implementation. No WPs were developed in the design to provide capacity building for MCS at national and UPT levels to help the Indonesian Government to combat IUU fishing[18]. The outcome was a **luke-warm engagement from the KKP from the outset**. Although their full participation is essential to project success, at the beginning of the project the KKP may have felt bypassed, hence the unexpected delay and difficulties in negotiating an Implementation Agreement in 2017. The situation has improved markedly since the midline point with strong efforts by the project to engage with PSDKP, and this has resulted in a more coherent partnership approach at the endline. **In retrospect it might have been better to have scaled back on the *Phinisi* roll-out in the regions, focusing more on testing it with PSDKP in Jakarta**.

[18] It is only since early 2018 that special arrangements were made by project management to train PSDKP staff in the provinces through Hatfield and a local consultant.

From a regulatory perspective, vessels >30GT are required to carry electronic VMS by law, whereas <30 GT are not. Consequently, PSDKP and other provincial offices do not have a mandate to take legal action against <30 GT vessels found fishing illegally, although they can refer cases to Jakarta for action. The assumption in project design was that changes in regulatory environment for <30GT would be forthcoming, but the risk was that it may not happen. If so, this may have reduced the chances of sustainability and impact even if VMS solutions and packages are successfully piloted and developed. Had this been assessed as a risk, improvements to project design, through the identification of mitigating activities necessary to help further influence policy change, would have been articulated.

One weakness of the approach was the poor initial use of the logical framework analysis (LFA). An LFA was developed during the design, but it was not really based around the hierarchical approach for which it was intended e.g. connecting goal / impacts to outcomes, to outputs to activities. Once the M&E component started in earnest, the LFA was refined which removed many of the disconnects but could not affect any change to the Work Packages which were fully established at that point.

8.1.2 Efficiency

Project initiation design & procurement: IDP solution designed and shipped to Indonesia. Inmarsat had already designed and shipped VMS+ equipment to Indonesia by March 2017. From a technical aspect, the implementation of the design was efficient and effective. Management was resourceful in its search for vessels to include in its pilot, so with months of delay, the project was ready to install equipment by early September with final boats recruited by 20 October 2018. The KKP's requirements were mapped and documented effectively by Catapult for use in other important design WPs (DI-210, DI-310.3 and DI-400 series) to develop KKP's' use of VMS in their MCS (both and land and sea based).

PointTrek installed and operational in pilot vessels <30 GT in selected port areas. Once boats were identified, the process of PointTrek installation and training in its use by SISFO was timely and well managed and considered both efficient and effective. Frequent follow up with one to one coaching / problem solving has resulted in high usage of equipment, mainly for communication purposes, especially in Benoa port. Feedback from fishermen indicates that (to their knowledge) no other VMS/communication equipment targeting the <30GT vessels is available. Of the five other competitor firm's products in the field, PointTrek application is considered the leader in terms of applicability, user friendliness and cost and is the only one offering SMS communication[19].

VMS technology developed for MCS purposes and Government staff trained in its use for IUU detection. Tasks undertaken in DI-210 and DI-310 aimed to recreate the VMS Web Application based on knowledge of existing application in KKP Command Centre and then enhance it with more reliable system architecture e.g. via *Phinisi* has progressed efficiently. A local consultant used outputs from WP DI-220.1 to improve the KKP's VMS command centre management system completed January 2018. The web-based VMS application *Phinisi* VMS was developed by May 2018 and after training (by Hatfield and consultant) was piloted at PSDKP level in Benoa and Lombok for tracking <30 GT vessels. Whist staff were trained in its use, due to a lack of a regulatory authority for VMS in vessels <30 GT and limited manpower, there has been very little use of the *Phinisi* software since its installation and up to the endline, especially in the UPT and SATWAS offices (where it has been offline since April 2019).

[19] A potential competitor from CLS is appearing in late 2019

Under DI-400 WP, the objective is to trial the VMS system with KKP patrol boats, assess results and complete a viable integrated VMS system for use by KKP. Following approval by KKP, one patrol boats was fitted with a Fleet One GX terminal and the system integrated with the *Phinisi* web application so that vessels can send / receive data. A quote for ongoing airtime provision has been provide to KKP for their approval.

Demand and Supply conditions researched, and business model defined. In WP DI-340, human-centred design methodologies were used to understand the behaviour and needs of fishing communities. Outputs assisted Inmarsat to improve their VMS+ technology and product roadmap and assist service providers to develop new VMS service and applications supported by end-user research.

Under WP-360, Catapult produced a report on the additional use-cases and value-add services was produced with recommendations and a guide entitled "*Design guide outlining key service update recommendations before wider commercial roll-out*" was produced. The purpose of WP DI-370 implemented by Marine Change is to create a business model for the IDP product developed by SISFO. After considerable delays, recommendations for the business model were finalised in September 2018. This is due to be updated jointly by Marine Change and Hatfield in September 2019.

Knowledge sharing media materials produced and shared with target stakeholders and partners. Information sharing using the Communication Plan has been both efficient and effective in keeping a wide range of (over 100) stakeholders informed with updates and reports produced. With the Devex and Inmarsat micro-sites, a series of articles are shared on progress and outcomes achieved. A Whitepaper was developed by Hatfield was shared with KKP on policy and legislative development for the <30GT vessel class. The Devex VDO media should reach a large audience, but timing of its release was delayed (due to the earthquake disaster in Lombok) to end of June 2019. A final whitepaper (under DI-260.4) on "Fisheries welfare through digital enablement, and effective use of VMS by a modern fisheries agency" was prepared by Inmarsat and shared by end of 2018.

Key Result 8: M&E manuals, documents and reports produced in a timely manner. All guidelines, documents and reports on project progress including 3 Quarterly Performance Reports were delivered within the specified timeframe without delay, except the baseline report (delayed). The Log Frame is updated for each QPR report and importantly, adjustments made to indicators and targets based on evidence received from field data, which keeps it both updated and relevant. With hindsight, more pressure should have been applied to hold a workshop to review the Logical Framework with project partners in early 2017. This would both clarify WPs, Key Results, Outcomes and Goals and ensure all partner had clear understanding of project objectives and implementation arrangements. The collection and analysis of field data from SMS usage, Cost-Earnings survey work was both efficient and effective in measuring different outcome indicators.

Efficiency of Implementation Arrangements: The implementation arrangements in the project have been efficient despite the remote locations of different senior project managers. However, there have been occasions where the project may have benefited from periodic project meetings (or "project retreat") where through face to face interaction, open and frank conversations between project partners to resolve issues and improve understanding of each partner's role and needs may be held.

8.2 Assessment of the likelihood of achieving Project Outcomes

Outcome 1: Safety and security of mid-sized fishing vessels (<30GT) improved using satellite-based communication and VMS technology

The project objectives are still highly relevant, particularly in terms of ensuring safety at sea and for allowing sea - sea, sea – land and land – sea communication during the majority of fishing trips when out of cellular range. The PointTrek VMS+ equipment has already proved to be highly effective at saving lives, producing more effective SAR operations, pre-empting extreme weather events and improving well-being onboard fishing vessels. For this it is highly valued by both fishing crews, their families as well as fleet coordinators and operators. However the system is still to be formally linked into government SAR processes.

Outcome 2: Welfare and livelihoods of fishers and their dependents improved using satellite-based communication and VMS technology

The cost-earnings analysis results show that, in the hands of experienced and proactive fishing captains, the VMS+ solution can make a real difference to fish catch volumes (increases of 2 – 6%) and vessel profit margins (increases of 2 – 15%), especially for the handline vessels, where the impact is magnified through synergies with commonly coordinated groups. This said, the pilot also showed that many vessels did not realise these benefits, with only 12% of the pilot fleet regularly using SMS messaging by the end of the pilot project. This suggests that further training and development, based upon practical experience of how the VMS+ system can improve operational efficiency, would add to the long-term legacy of this project, esp. if such equipment becomes mandatory of vessels <30 GT in the future.

Outcome 3: Levels of IUU fishing reduced through targeted monitoring, control and surveillance (MCS) resulting from the use of satellite-based communication and VMS technology

The pilot project is unlikely to have any measurable impact on IUU fishing. This is for a number of reasons, including (i) PSDKP are unable to use the outputs of the system to formally charge or pursue administrative or criminal cases for vessels <30 GT using VMS evidence as there is currently no legislation for them to do so and (ii) the two pilot fleets are essentially highly compliant and thus considered low risk in any case. This said, the fact that <30 GT vessels are now able to be tracked, and the *Phinisi* software is proving potentially useful, with a change in legislation over the use of VMS and VMS-derived information, this situation could be easily reversed, especially if expended to other, less compliant fleets.

Outcome 4: Improved capacity to plan and implement monitoring, control and surveillance (MCS) within the national and local government

For reasons linked to those in Outcome 3, there is no evidence that the project has improved PSDKP and their partners' ability to plan and implement monitoring, control and surveillance (MCS) for vessels < 30 GT within the national and local government. Although the *Phinisi* VMS-based Fisheries Monitoring Centre (FMC) software has been installed in Benoa Bali UPT and the Larantuka SATWAS offices, the generally compliant handline fishery is considered low-risk and therefore not the focus of MCS operations. This extends to the lack of formal joint operations with other surveillance authorities such as the coast guard, marine police and navy.

Outcome 5: Policy environment for the use of satellite-based vessel monitoring systems for regulating <30 GT fishing vessels established

Although no regulation requiring vessels <30 GT to install VMS has yet been proposed, the outcomes of the project (e.g. lives saved and evidence that a VMS+ solution can improve fisher livelihoods) have provided PSDKP useful empirical evidence that, with a suitably sensitive approach, fishers might be persuaded that lowering of the VMS threshold would be more acceptable if accompanied by a VMS+ solution. There is still much work to be done on this policy change e.g. to assess what the lower threshold might be (e.g. between 10 and 20 GT) and whether the VMS+ solution is appropriate for other vessels, such as lower value small pelagic fisheries.

8.3 Project Sustainability and Replicability

EC guidelines[20] define sustainability as "*whether the flow of benefits to the beneficiaries, and to society generally, is likely to continue, and why*". The key word here is "likely", from which it is clear that evaluation missions during implementation may be asked to make subjective judgements and determine whether the *mechanisms* for sustainability are in place. The only way to judge sustainability objectively is *ex post*. The most critical factors that will influence the potential sustainability of this IPP include the following:

1. Whether necessary changes are made by KKP in its regulatory framework for purposes of IUU and MCS management that requires the <30GT vessel class to carry VMS equipment by law. If new supportive regulations are approved as hoped, then the market for PointTrek solutions for <30 GT vessel class maybe considered large indeed. If not, then the degree of sustainability, replication and impact may be much diminished. This aspect remains the most critical risk to project success.
2. Whether KKP makes the necessary approval to adopt the IPP's VMS solutions piloted and developed for use in its strategy for IUU detection and overall MCS system.
3. Whether the low cost VMS / communication package piloted in the IPP is completed and available by the project end and if so, is the final package competitive in the market place?

Sustainability related questions areas were developed by the EU PCM[21] as useful checks to validate risk and identify mitigation measure/strategies to pursue to reduce risk of non-sustainability. The litmus test for sustainability relates to the question of what happens when the project support is withdrawn and whether the sustainability issues have been sufficiently addressed through consolidation processes with stakeholders and Government, such that a platform exists through which outcomes generated may be sustained and replicated leading to long term impact.

The table overleaf includes eight sustainability criteria areas, together with progress and comments and a Sustainability Rating (High means good chance of sustainability; Low means a low chance of sustainability). This table was also used in the midline and has been updated to include the endline status as well.

[20] See Evaluation in the European Commission, 2001; p.16

[21] See the EU Project Cycle Management Handbook 2001 pages 53 and 54

Table 10: Assessment of Sustainability Aspects together with rating at Mid and End Lines

Sustainability Criteria	Progress made / comments	Sustainability Rating[22]	
		Midline	Endline
1. Ownership by beneficiaries	From the use of PointTrek for <30GT piloted by fishermen for the first time, the feedback was initially positive regarding its use. However, although valued by most vessel coordinators / owners and the more efficient fishing captains, the use of SMS / VMS by pilot boats has dropped considerably. The cause of this should be investigated and action to rectify this taken before the Legacy Evaluation.	**HIGH**	**MODERATE**
2. Policy support	Without a change in the regulatory framework to support the compulsory use of VMS and e-logbook use for <30GT vessel class, sustainability is in doubt.	**LOW TO MODERATE**	**LOW**
3. Appropriate technology	The IPP has focused its resources and time in developing the most appropriate technology for the <30 GT vessel class based on detailed research of needs and behaviour. On review of the products of 5 local competitors, PointTrek is competitive. However, questions remain on the affordability of the hardware to new users. The new integrated VMS system for use by KKP that links directly to IPP supported pilot vessels, patrol boats etc through the *Phinisi* web based platform is considered appropriate and well received to date. Completing a final VMS+ package integrating vessel, patrol vessel, KKP/PSDKP monitoring requirements could be one of the most important outcomes in this project.	**MODERATE TO HIGH**	**MODERATE**
4. Environmental Conservation	In theory, sustainable fisheries will result due to reduced incidence of IUU fishing activities and higher level of successful prosecutions. However, IUU fishing is based on different situations e.g. whether the concerned boat has a valid license for the FMA or in cases of protected areas where fishing is banned (e.g. MPAs). This evaluation has found that the use of VMS and communications has increased the efficiency / effectiveness of catching fish and higher income, including catches of juvenile yellow-fin tuna from the FAD-based handline fisheries. Further regulatory reform is required to link licenses issued to policies that aim to reduce fishing pressure through quota or other harvest control strategies. If not, the project may increase fishing efficiency but not tackle effectively the degree of fishing pressure that may mean fish stocks will dwindle further.	**LOW TO MODERATE**	**MODERATE**
5. Socio-cultural issues	Safety at Sea is a high priority for fishermen. With VMS communication, this evaluation has shown that fishermen feel safer due to weather alerts and communication in times of emergency.	**HIGH**	**HIGH**
6. Gender	Although this project does not have a specific gender objective, the VMS technology was found to be of great comfort for wives and family members of fishing crew and captains with the knowledge that they may contact each other in time of need and emergency.	**HIGH**	**HIGH**

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LOW	←→	MODERATE	←→	HIGH

Sustainability Criteria	Progress made / comments	Sustainability Rating[22]	
		Midline	Endline
7. Institutional & management capacity	It is still early days in terms of use of *Phinisi* by PSDKP/KKP staff. Initial feedback indicates that the applications are useful and with improvements in the web based application, the technology will enable staff to identify clearly cases of IUU for the very first time with <30 GT. Regardless of the policy-limitations mentioned above, the lingering constraint is the lack of human capacity to apply VMS-based monitoring systems to the very large numbers of <30 GT vessels involved, hence the rating of Low to Moderate. Should a VMS regulation be introduced for <30 GT vessels, then the necessary resources would need to be allocated and capacity improved.	**MODERATE**	**LOW TO MODERATE**
8. Economic and Financial viability	Economic viability indicates that the product (VMS+) when fully used, provides a flow of positive economic benefits compared to costs, but only when SMS communication is regularly and effectively used. Financial viability reflects a degree of affordability for intended beneficiaries such that financial benefits outweigh the costs involved. The project has correctly targeted the R&D into a low cost affordable VMS package for use in roll out activities. Evidence to date indicates that the final product will be both affordable and financially viable for target buyers. However these benefits are not necessarily accessed by all users unless well trained and orientated. Hence sustainability is rated Moderate for both parameters.	**HIGH**	**MODERATE**

In summary, whilst the basic concept of the project is still relevant and potentially sustainable, the current lack of policy support for electronic VMS-based fisheries monitoring, control and surveillance has limited the engagement of KKP in using the project outputs to date. Should government policy and enabling legislation change, this situation would change rapidly.

There are also some concerns over the environmental sustainability of the project, as more efficient fishing means increasing catch levels. Whilst potentially positive for vessel profitability and crew livelihoods, this may have long-term implications for targeted fish stocks, especially for yellowfin tuna. However it is also recognised that improving e-reporting of fish catches e.g. via electronic logbooks, as enabled by this project, will mitigate this risk to some degree.

On a more positive side, the IDP equipment has been highly valued by vessel coordinators, crew and their families, and so long as its cost-effectiveness can be proven and demonstrated to project beneficiaries, post-project uptake by vessels and operators outside the pilot areas is considered highly likely.

8.4 Assessment of likelihood of achieving Project Impact

Impact takes time to materialise, and it is premature even at this endline point to expect this Evaluation to pronounce on it. All the Evaluation Team can do is report whether, in its opinion, the ingredients for eventual impact are present.

Impact 1: The safety, productivity and food security of Indonesian fishers and their communities enhanced through the expansion and adoption of VMS. By 2021, the use of satellite-based communications / VMS technology in pilot areas are adopted and sustained by the majority of pilot fishing vessels leading to improved livelihoods, safety at sea, reduced IUU and improved conservation and sustainable fishing practices in the related FMA.

- The pilot system has already proved itself in terms of boosting safety at sea and will no doubted further reduce the potential for mechanical failure, improve SAR operational efficiencies and provide reassurance to vessels crews and their families.
- There are also indications that the system is improving the productivity of the more experienced and proactive fishing vessels by both reducing operational costs and increasing catches per unit effort. This is likely to lead to improved livelihoods amongst captains and crew, especially given most are on a catch share system. If the system is further adopted by the large 10 – 30 GT vessel classes in Indonesia, it could have a considerable cumulative impact on fishing communities. However as noted earlier in this evaluation, there is still some uncertainty over how the VMS+ benefits might be replicated in fisheries outside of the pilot areas, esp. or small-scale vessels focusing on small pelagic fisheries for local and domestic consumption.
- There is also some concern over the potential impact on fish stocks if fishing efficiency is increased through use of the VMS+ equipment. This needs to be mitigated through enabling better catch monitoring via e-logbooks and feeding this new spatial data to fisheries managers in the Indonesian FMAs, as well as regional managers in IOTC and the WCPFC.

Impact 2: The effectiveness of monitoring & enforcement efforts by the authorities improved through technology & process improvements. By 2021 improvements to fisheries management & legislation, experience gained, and lessons learnt from the project leads to an increase in local demand for an expanded platform in Indonesia for satellite-assisted MCS with the result that MCS technology and processes are developed and adopted in other FMAs.

- At present there is no likelihood that KKP have systematically adopted this new technology to manage the <30 GT fishing fleets. As discussed above, this is a result of a combination of factors, including a lack of jurisdictional and legislative support for the use of satellite-based VMS in < 30 GT fisheries management, as well as the low IUU risk attributed to the pilot fleets. Should there be a change in policy and enabling legislation, this situation could rapidly change.

In order to gain **impact** (which takes time to manifest) the outcomes gained have to be sustained beyond the project life. Impact indicators in the Log Frame highlight:

1. Adoption and use beyond project life by existing pilot vessels;
2. Roll out/ upscaling through targeting of additional vessels with VMS packages
3. Continued use of the integrated VMS solution for MCS purposes by KKP and provincial government to monitor IUU in pilot FMAs
4. Replication (scaling up) by government in other FMAs

9. Recommendations

9.1 Legacy Evaluation

It has been agreed to conduct a 'Legacy Evaluation' in 2020. Too soon for a proper legacy evaluation, this will explore the immediate sustainability of the project after VMS+ airtime funding ceased at the end of July 2019. The scope of the legacy evaluation is as follows:

1. The pilot fleet of <30 GT vessels in Benoa Bali, Lombok, Larantuka and Maumere.
2. The impact indictors under Impact 1, excluding II-1-4 (Accumulated total additional vessel earning per trip for all vessels in pilot fleets from Lombok and Larantuka (total net benefit) from April 2018 to date compared to Control boats) as no further cost-earnings data will be collected after the endline.
3. Selected outcome indicators relating to VMS+ activity e.g. SMS messaging and positional pings.
4. Any policy changes in the use of VMS for vessels under 30 GT.

The following recommendations are made for discussion with Inmarsat, Caribou Digital and the UKSA:

1. The timing of the Legacy Evaluation is moved from March 2019 (as planned) to either June or September 2020.
2. The evaluation focuses on the following elements:
    a. Analysis of the number and characteristics (size, fishery, etc) of vessels continuing using the VMS+ solution, including volume of data used.
    b. FDGs with selected vessels in Benoa Bali and Larantuka on (i) for those not using the VMS+ anymore, why they decided not to continue with the VMS+ solution and (ii) why those that continued to use the VMS did so, and their longer-term outlook.
    c. Additional uptake of VMS+ outside of the pilot project fleet.
    d. Response to the final policy document and business model (to be issued September 2019) in terms of impact sustainability.

9.2 General

For UK Space Agency

- **Recommendation 1:** The UK Space Agency ensure that all of its project managers are grounded in the basic rudiments of project M&E and the use of M&E information in project oversight and management functions.
- **Recommendation 2:** The UK Space Agency place more emphasis on the use of a Logical Framework Approach to project design in its Application Form. In particular, it is important that work packages (e.g. Activities in the LFA sense) are clearly linked to the Key Results (in terms of Outcomes and Impacts).
- **Recommendation 3:** Project design could be linked to some form of project development grant funding[23] linked to different step changes (e.g. initial concept through to fully costed detailed designs) to encourage the development of well-designed projects that use best practise e.g. the LFA from the start.

[23] See http://web.worldbank.org/archive/website00673/WEB/OTHER/GEFGRA-2.HTM

For Project Management:

- **Recommendation 4**: Inmarsat and partners (already underway or planned) continue to focus on improvements to PointTrek equipment and apps (e.g. to develop an interface with Department of Capture Fisheries for e-logbooks, a geo-fence system, weather apps, voice call protocols and solution to battery/power supply issues) to ensure it remains competitive with new offerings from other satellite providers. .
- **Recommendation 5:** Inmarsat and partners target Vessel Co-ordinators and fish export companies as the first segment in its marketing approach rather than captains and vessel owners (particularly in <30GT class) who may not fully appreciate the benefits generated in view of investment expenditure.
- **Recommendation 6**: The handline fishery has demonstrated that information and cooperation fed via SMS and the broadband feed can improve fishing efficiency, especially when vessels are fishing as a cooperative group on FADs. This evolving experience needs to be captured and documented and developed into practical guidelines and advice for maximising fishing efficiency through better communication and data provision.

For KKP and Project Management:

- **Recommendation 7**: KKP and Project partners (particularly Hatfield) continue to collaborate closely from now to the Legacy Evaluation, to review the regulatory framework for <30GT vessels using the Background Paper produced on best practice solutions most suited to Indonesian Fisheries and find the most pragmatic solution to VMS application for this vessel class. Lack of regulatory reform was identified as the biggest threat / risk to the project's sustainability and impact. Project Management is encouraged to explore all possible avenues to support KKP in its efforts to approve legislation / decrees to give PSDKP mandate to monitor <30 GT vessels and that carrying VMS is compulsory for these boats whilst at sea, noting that (i) the positive operating and financial benefits detected by the project are restricted to the more efficient fishing vessel captains / vessel coordinator partnerships and (ii) may not be available in all mid-size (e.g. 10 – 30 GT) fisheries.
- **Recommendation 8:** Following the above, KKP could instigate its own research project to test the cost-benefits of installing and using a VMS+ solution on other fisheries (e.g. locations, gear types, target fisheries, and size classes) elsewhere in the Indonesian archipelago in order to determine the impacts – both positive and negative, of this use of this equipment outside of this current project's pilot fleet. This would be a useful impact analysis as part of designing any lowering of the current 30 GT threshold for the mandatory use of VMS.
- **Recommendation 9**. PSDKP should be encouraged to (i) utilise the *Phinisi* system for monitoring fishing vessels <30 GT, even in the absence of a formal mandate to do so, and to invest in new processes and Standard Operating Procedures (SOPs) for analysing and surveillance asset tasking for the control of these mid-sized fishing vessels. This effort should be focused at both UPT and SATWAS levels.

KKP Partners

- **Recommendation 10**. Development of formal linkages with BASARNAS and other relevant agencies (e.g. Marine Police and the Indonesian Navy) for SAR, including formalised Standard Operating Procedures (SOPs).

Appendix A: Logical Framework Analysis (Version 9-2)

PROJECT NAME	Design and implementation of innovative solutions for smart satellite technology to promote inclusive and sustainable fishing practices in Indonesia (< 30 GT)									
IMPACT 1	**Impact Indicators (II) 1 (2021 target)**		**2017 *Q4***		**2018 (end Q2)**		**2018 (end Q4)**		**2019 (Q2, endline)**		**2020 (end Q3, legacy)**
The safety, productivity and food security of Indonesian fishers and their communities enhanced through the expansion and adoption of VMS By 2021, the use of satellite-based communications / VMS technology in pilot areas are adopted and sustained by the majority of pilot fishing vessels leading to improved livelihoods, safety at sea, reduced IUU and improved conservation and sustainable fishing practices in the related FMA.	II1-1. % of original pilot fishing vessels in Pilot FMAs still using satellite-based services / VMS in 2021 (<30 GT 75%)	**Planned**	No target		No target		No target		No target		20%
		Achieved	75%		66%		51%		37%		
	II1-2. No. of additional fishing vessels (20-30 GT) in pilot FMAs using satellite-based services / VMS in 2021 (<30 GT 500)	**Planned**	Zero		100		250		400		500
		Achieved	Zero		0		0		4		
	II1-3. No. of additional fishing vessels (20-30 GT) in additional FMAs with satellite-based services / VMS in 2021 (<30 GT 200)	**Planned**	Zero		20		100		-		200
		Achieved	Zero		0		0				
	II1-4a.Accumulated total additional vessel earning per trip for all vessels in pilot fleets from Lombok and Larantuka (total net benefit) from April 2018 to date compared to Control boats (GBP)	**Location**	Lombok	L'tuka	Lombok	L'tuka	Lombok	L'tuka	Lombok	L'tuka	
		Planned	5%		5%		5%		5%		
		Achieved	Zero		£16,567	£22,630	No data	No data	£122,347	£127,778	
	II1-4b. Accumulated total additional incremental average vessel earning per trip for all vessels in pilot fleets estimated from all pilot boats (Lombok, Benoa, Larantuka and Maurere from January 2018 to June 2019 (18 months) compared to Control boats (GBP).								£418,518		
	II1-5. No. of lives saved through use of satellite-based services / VMS (<30 GT 1 per annum)	**Planned**	1		1		1		1		1
		Achieved	6		20		13		0		
IMPACT 2	**Impact Indicators (II) 2 (2021 target)**		**2017 *Q4***		**2018 (end Q2)**		**2019 (end Q2)**		**2019 (Q3, endline)**		**2020 (end Q3, legacy)**
The effectiveness of monitoring & enforcement efforts by the authorities improved through technology & process improvements. By 2021 improvements to fisheries management & legislation, experience gained and lessons learnt from the project leads to an increase in local demand for an expanded platform in Indonesia for satellite assisted MCS	II2-1. No. of additional FMAs / RFMC / UPTs utilizing VMS data for fisheries MCS in vessels between 20-30 GT (6 FMAs).	**Planned**	None planned		None planned		3		3		6
		Achieved					-		-		
	II2-2. No. of formal joint MCS initiatives between central KKP and Provincial / District-level authorities (UPTs and DKP) formally implemented annually by 2021 (4)	**Planned**	None planned		None planned		None planned		4		4
		Achieved									

PROJECT NAME	Design and implementation of innovative solutions for smart satellite technology to promote inclusive and sustainable fishing practices in Indonesia (< 30 GT)							
IMPACT 1	**Impact Indicators (II) 1 (2021 target)**		**2017 *Q4***	**2018 (end Q2)**	**2018 (end Q4)**	**2019 (Q2, endline)**	**2020 (end Q3, legacy)**
The safety, productivity and food security of Indonesian fishers and their communities enhanced through the expansion and adoption of VMS By 2021, the use of satellite-based communications / VMS technology in pilot areas are adopted and sustained by the majority of pilot fishing vessels leading to improved livelihoods, safety at sea, reduced IUU and improved conservation and sustainable fishing practices in the related FMA.	II1-1. % of original pilot fishing vessels in Pilot FMAs still using satellite-based services / VMS in 2021 (<30 GT 75%)	**Planned**	No target	No target	No target	No target	20%
		Achieved	75%	66%	51%	37%	
	II1-2. No. of additional fishing vessels (20-30 GT) in pilot FMAs using satellite-based services / VMS in 2021 (<30 GT 500)	**Planned**	Zero	100	250	400	500
		Achieved	Zero	0	0	4	
	II1-3. No. of additional fishing vessels (20-30 GT) in additional FMAs with satellite-based services / VMS in 2021 (<30 GT 200)	**Planned**	Zero	20	100	-	200
		Achieved	Zero	0	0		
	II1-4a.Accumulated total additional vessel earning per trip for all vessels in pilot fleets from Lombok and Larantuka (total net benefit) from April 2018 to date compared to Control boats (GBP)	**Location**	Lombok / L'tuka	Lombok / L'tuka	Lombok / L'tuka	Lombok / L'tuka	
		Planned	5%	5%	5%	5%	
		Achieved	Zero	£16,567 / £22,630	No data / No data	£124,849 / £104,791	
	II1-4b. Accumulated total additional incremental average vessel earning per trip for all vessels in pilot fleets estimated from all pilot boats (Lombok, Benoa, Larantuka and Maurere from January 2018 to June 2019 (18 months) compared to Control boats (GBP).					£418,518	
	II1-5. No. of lives saved through use of satellite-based services / VMS (<30 GT 1 per annum)	**Planned**	1	1	1	1	1
		Achieved	6	20	17	0	
IMPACT 2	**Impact Indicators (II) 2 (2021 target)**		**2017 *Q4***	**2018 (end Q2)**	**2019 (end Q2)**	**2019 (Q3, endline)**	**2020 (end Q3, legacy)**
The effectiveness of monitoring & enforcement efforts by the authorities improved through technology & process improvements. By 2021 improvements to fisheries management & legislation, experience gained and lessons learnt from the project leads to an increase in local demand for an expanded platform in Indonesia for satellite assisted MCS	II2-1. No. of additional FMAs / RFMC / UPTs utilizing VMS data for fisheries MCS in vessels between 20-30 GT (6 FMAs).	**Planned**	None planned	None planned	3	3	6
		Achieved			-	-	
	II2-2. No. of formal joint MCS initiatives between central KKP and Provincial / District-level authorities (UPTs and DKP) formally implemented annually by 2021 (4)	**Planned**	None planned	None planned	None planned	4	4
		Achieved					

OUTCOME 1	Outcome Indicators (OC) 1 (2019 target)		2017 *Q4*	2018 *End Q1*	2018 *End Q2*	2018 *End Q3*	2018 *End Q4*	2019 *End Q1*	2019 *End Q2 Endline*
Safety and security of mid-sized fishing vessels (20-30GT) improved using satellite-based communication and VMS technology (KPI 1).	OC1-1. No. of SMS message declarations for assistance (#2) transmitted (out) by pilot vessels over quarter by port (<30 GT 10)	**Planned**	5	3	5	5	5	3	5
		Achieved	81	8	15	26	5	3	2
	OC1-2. No. of emergency SOS signals (panic button or message) (#1) transmitted by pilot vessels over quarter (<30 GT 2)	**Planned**	1	1	-	2	2	2	2
		Achieved	4	-	-	5	-	-	-
	OC1-3. No. of formal actions taken to respond to emergency SOS messages received from pilot vessels over quarter (<30 GT 2)	**Planned**	1	1	1	2	2	2	2
		Achieved	2	-	1	-	-	-	-
	OC1-4. No. of decisions (e.g. stop fishing, heave to, seek shelter, etc.) made to safeguard vessel and crew resulting from weather information (#3) received over quarter (<30 GT 400)	**Planned**	25	15	25	25	25	15	25
		Achieved	39	18	78	59	28	9	33

OUTCOME 2	Outcome Indicators (OC) 2 (2019 target)		2017 *Q4*	2018 *End Q1*	2018 *End Q2*		2018 *End Q3*		2018 *End Q4*		2019 *End Q1*		2019 *End Q2 Endline*	
Welfare and livelihoods of fishers and their dependents improved using satellite-based communication and VMS technology (KPI 2).	OC2-1. Number of additional SMS data packages (of 50) purchased over period by pilot vessels (<30 GT 3)	**Planned**	1	1	2		2		2		3		3	
		Achieved	21	5	14		18		15		-		4	
	OC2-2. No. of SMS messages transmitted / received by fishing boats relating to fishing opportunities (#6) (<30 GT 20)	**Planned**			150		150		150		150		150	
		Achieved			296		164		223		35		145	
	OC2-3. No. of SMS messages transmitted / received by fishing boats (#8) relating to sales / market opportunities (<30 GT 20)	**Planned**			150		150		150		150		150	
		Achieved			185		207		140		87		123	
	OC2-4. No. of SMS messages transmitted / received by fishing boats (#9) relating to logistics (ice, bait, victuals) (<30 GT 20)	**Planned**			50		150		150		150		150	
		Achieved			101		141		144		737		89	
	OC2-5. Sentinel pilot vessels have a higher catch volume per fishing trip against controls in Lombok & Larantuka (Kgs/trip)	**Location**			Lombok	L'tuka	Lombok	L'tuka	Lombok	L'tuka	Lombok	L'tuka	Lombok	L'tuka
		Planned	2%	2%	No targets									
		Achieved	12%	<0%	521	100	-303	304	-86	-16	-365	22	425	-312
	OC2-6. Sentinel pilot vessels have a higher gross margin per fishing trip against controls in Lombok & Larantuka (incremental gross income per trip in GBP)	**Location**			Lombok	L'tuka	Lombok	L'tuka	Lombok	L'tuka	Lombok	L'tuka	Lombok	L'tuka
		Planned	2%	2%	No targets									
		Achieved	12%	<0%	£91	£4	-£1	£278	-£150	-£67	£65.92	£30.91	£361	-£267
	OC2-7. Sentinel pilot vessels have increased fish catch share income per crew member per day at sea against controls in Lombok & Larantuka (incremental income per crew member per day at sea/ GBP)	**Location**			Lombok	L'tuka	Lombok	L'tuka	Lombok	L'tuka	Lombok	L'tuka	Lombok	L'tuka
		Planned	2%	2%	No targets									
		Achieved	12%	<0%	£0.44	£2.27	£0.03	£5.83	-£1.24	-£1.39	£0.29	-£1.77	£0.71	-£1.55
	OC2-8.Sentinel pilot vessels have reduced time at sea against controls in Lombok & Larantuka (days less per trip). Note: positive number indicates less time at sea and negative indicators more time at sea	**Location**			Lombok	L'tuka	Lombok	L'tuka	Lombok	L'tuka	Lombok	L'tuka	Lombok	L'tuka
		Planned	2%	2%	No targets									
		Achieved	12%	<0%	0.7	-0.8	-0.9	-0.3	-3.8	-0.04	2.1	0.13	1.84	-0.33
	OC2-9. Sentinel pilot vessels have reduced fuel usage per trip against controls in Lombok & Larantuka (Less Cans of fuel used per trip): Note - negative number indicates more fuel cans used by sentinel compared to control	**Location**			Lombok	L'tuka	Lombok	L'tuka	Lombok	L'tuka	Lombok	L'tuka	Lombok	L'tuka
		Planned	2%	2%	No targets									
		Achieved	12%	<0%	-0.58	-0.93	0.13	-1.02	-1.76	0.72	4.10	0.28	0.03	0.76
	OC2-10. No. of pilot vessels utilising electronic logbook systems (e.g. data exchange) over quarter (<30 GT 20)	**Planned**	-	2	5		10		15		20		20	
		Achieved	-	-	96		23		23		-		-	

OUTCOME 3	Outcome Indicators (OC) 3 (2019 target)		2017 *Q4*	2018 *End Q1*	2018 *End Q2*	2018 *End Q3 MTR*	2018 *End Q4*	2019 *End Q1*	2019 *End Q2 Endline*
Levels of IUU fishing (with client fleet) reduced through targeted monitoring, control and surveillance (MCS) resulting from the use of satellite-based communication and VMS technology (KPI 3).	OC3-1. Average number of positional 'pings' over quarter (<30 GT (Benoa Bali vessels only)	**Planned**	100	200	225	300	300	300	300
		Achieved	172	27,007	21,861	28,559	21,279	4,728	10,926
	OC3-2. No. of geofencing alerts transmitted over quarter (<30 GT 5)	**Planned**	n/a	1	2	3	3	2	2
		Achieved	n/a	-	-	-	-	-	-
	OC3-3. No. of reported observations of IUU events by third parties encountered by pilot vessels (#7) per quarter (<30 GT 5)	**Planned**	Zero	2	3	4	4	5	5
		Achieved	Zero	0	1	0	0	-	-
OUTCOME 4	**Outcome Indicators (OC) 4 (2019 target)**		**2017 *Q4***	**2018 *End Q1***	**2018 *End Q2***	**2018 *End Q3 MTR***	**2018 *End Q4***	**2019 *End Q1***	**2019 *End Q2 Endline***
Improved capacity to plan and implement monitoring, control and surveillance (MCS) within the national and local government (KPI 4).	OC4-1. No. of actions taken against potentially non-compliant pilot vessels (<30 GT)	**Planned**	None planned	None planned	No target	No target	No target	No target	No target
		Achieved			PSDKP staff trained but VMS app' not used	PSDKP staff trained but VMS app' not used	PSDKP staff trained but VMS app' not used	PSDKP staff trained but VMS app' not used	PSDKP staff trained but VMS app' not used
	OC4-2. No. of Phinisi log in events by UPT Benoa Bali & SATWAS Larantuka per quarter	**Planned**	None planned	None planned	No target	No target	No target	No target	No target
		Achieved			61 (37 vessels)	No data available	-	21	16
OUTCOME 5	**Outcome Indicators (OC) 5 (2019 target)**		**2017 *Q4***	**2018 *End Q1***	**2018 *End Q2***	**2018 *End Q3 MTR***	**2018 *End Q4***	**2019 *End Q1***	**2019 *End Q2 Endline***
Policy environment for the use of satellite-based vessel monitoring systems for regulating <30 GT fishing vessels established (KPI 4).	OC5-1. KKP makes necessary changes to regulatory framework to include <30GT vessel class for mandatory VMS use (Yes/No)	**Planned**	None planned	None planned	None planned	None planned	None planned	None planned	Target 30/06/2019
		Achieved							Under consideration, but no drafts to date

OUTPUT 1	**Output Indicator (OP) 1-1**		**2017 *Q4***	**2018 *End Q1***	**2018 *End Q2***	**2018 *End Q3 MTR***	**2018 *End Q4***	**2019 *End Q1***	**2019 *End Q2 Endline***
1. By March 2018 VMS installed in 200 boats-includes satellite communications terminals, communications hub, back up battery, & user interface tablet (1.1) and 200 fishing boat crews trained in the use (1.1.2).	OP1-1 Number of new VMS units deployed and functional (<30 GT 200)	**Planned**	200	200	200	200	200	200	200
		Achieved		205	203	194	199	195	193
	Output Indicator (OP) 1-2		**2017 *Q4***	**2018 *End Q1***	**2018 *End Q2***	**2018 *End Q3 MTR***	**2018 *End Q4***	**2019 *End Q1***	**2019 *End Q2 Endline***
	OP1-2 Number of boat crews trained (<30 GT 200)	**Planned**	200	200	200	200	200	200	200
		Achieved		205	211	211	211	213	213
OUTPUT 2	**Output Indicator (OP) 2-1**		**2017 *Q4***	**2018 *End Q1***	**2018 *End Q2***	**2018 *End Q3 MTR***	**2018 *End Q4***	**2019 *End Q1***	**2019 *End Q2 Endline***
1. By February 2019, **human-centred design** (HCD) insights into user incentives ready for adoption for future VMS programmes .	OP2-1 Design guide outlining key service update recommendations before wider commercial roll-out	**Planned**	None planned	None planned	None planned	None planned	None planned	Catapault report	DI360.4
		Achieved			3 workshops held			Delivered	Delivered
OUTPUT 3	**Output Indicators (OP) 3-1**		**2017 *Q4***	**2018 *End Q1***	**2018 *End Q2***	**2018 *End Q3 MTR***	**2018 *End Q4***	**2019 *End Q1***	**2019 *End Q2 Endline***
3. By Dec 2018 a commercial model produced to demonstrate the feasibility and sustainability pathways .	OP3-1 Report kinds of models that could exist within the satellite model approach, key success factors, impacts and challenges.	**Planned**	None planned	None planned	None planned	DI370 (IDP)	None planned	MC Re. Ex. & Scaling Plans	None planned
		Achieved				30/09/2018		Delivered	
OUTPUT 4	**Output Indicators (OP) 4-1**		**2017 *Q4***	**2018 *End Q1***	**2018 *End Q2***	**2018 *End Q3 MTR***	**2018 *End Q4***	**2019 *End Q1***	**2019 *End Q2 Endline***
4. By Dec 2018, two policy briefs developed and disseminated to inform legislative process around best practices.	OP4-1 Number of white papers developed, formally discussed & disseminated.	**Planned**	DI320.1 delivered	None planned	DI320.2	None planned	None planned	Policy paper	Policy paper
		Achieved	Delivered June 2017		Delivered			Delivered	Update Sept 2019
OUTPUT 5	**Output Indicators (OP) 5-1**		**2017 *Q4***	**2018 *End Q1***	**2018 *End Q2***	**2018 *End Q3 MTR***	**2018 *End Q4***	**2019 *End Q1***	**2019 *End Q2 Endline***
5. By March 2019, three workshops held and one report disseminated on Starhub held to present pilot project findings and successes.	OP5-1. By June 2019, three workshops held and one report disseminated on Starhub held to present pilot project findings and successes.	**Planned**	None planned	Workshop 1	Workshop 2	None planned	None planned	KKP Workshop	Workshop (Project Completion)
		Achieved		Workshop 1 held				Delivered	Planned Sept 2019

Appendix B: Endline Evaluation Terms of Reference

POSEIDON
AQUATIC RESOURCE MANAGEMENT

Hatfield
CONSULTANTS

ENDLINE EVALUATION

FOR SUBMISSION AUGUST 2019

TERMS OF REFERENCE

APRIL 2019

VERSION 4

Background, Purpose & Scope

A consortium led by *Inmarsat*, together with the Indonesian *Ministry of Marine Affairs and Fisheries* (MMAF), is implementing a *UK Space Agency* funded project to design and implement innovative solutions for smart satellite technology to promote inclusive and sustainable fishing practices in Indonesia. This project, originally scheduled for two years, was implemented over 2.25 years.

Under Work Item I330, an **end-of-pilot Impact Assessment** will need to be undertaken and delivered as a 'Endline M&E Report' (DI330.7) at the end of the project in 2019. This was originally scheduled to take place in March 2019 but was re-scheduled to the end of July 2019 following start up delays in 2017 and a subsequent agreement for a three month extension. A two-week site visit to Indonesia will be made by a two-person M&E team over 21 July – 02 August 2019. An assessment will be made on the outcomes and impacts of the project with:

(1) fishing boat crews and their families;

(2) the use of the system by government partners as an integrated element of their VMS/satellite assisted MCS (which includes the completion of an affordable low cost VMS/Communication model relevant to <30 GT class together with relevant changes in the regulatory framework by KKP and approval/adoption of the developed MCS equipment by KKP for MCS use).

The Evaluation Team will undertake a series of Focused Group Discussions and interviews with Key Informants with both Government and private sector beneficiaries of the project. These Terms of Reference have been produced drawing on the findings and experience gained from the Midline Evaluation and Report (DI330-6) delivered at the end of September 2018. This report covered aspects related to project relevance and efficiency in detail together with an assessment of emerging effects and outcomes. The Evaluation will also draw on relevant M&E documents produced during the project, including the reports and documents listed in Table 1 below:

Table 11: List of M&E reports to date

Report number	Title	WP	Date first produced	Subsequent versions
1371/R/01/C	Monitoring and Evaluation Plan	DI330	31 Mar 2017	3: 12 July 2017
1317/R/03/C	Process for Conducting Baseline, Midline and Endline Assessments	DI330.2	30 June 2017	1.1: 13 July 2017
1317/R/04/A	Key Performance Indicators	DI330.3	30 June 2017	
1317/R/05/A	Monitoring & Evaluation Framework and Baseline Assessment (inc. Dashboard)	DI330.4 DI330.5	1 Aug 2017	2: 26 Sept 2017 3: 28 Feb 2018
1317/R/06/A	Project Progress Report 1 (Q4, 2017)	DI350.1	17 Dec 2017	
1317/R/07/A	Baseline Workshop Report (23 Feb 2018)	DI380.2	28 Feb 2018	1-1: 7 Mar 2018
1317/R/08/A	Monitoring, Control & Surveillance Institutional and Information Flow Baseline	DI330.2	05 March 2018	
1317/R/09/A	Project Progress Report 2 (Q1, 2018)	DI350.1	28 March 2018	
1317/R/10/A	Project Progress Report 3 (Q2, 2018)	DI350.1	03 July 2018	
1317/R/11/A	Mid of Pilot Impact Assessment	DI330.6	28 Sept 2018	
1317/R/12/A	Project Progress Report 4 (Q4, 2018)	DI350.1	21 Dec 2018	
1317/R/13/A	Project Progress Report 5 (Q1, 2019)	DI350.1	05 April 2019	

Proposed Activities and Outputs

The two-person M&E team from Poseidon will work with the local implementation team Hatfield Consultants to undertake an End Line Review/ Evaluation (ELR).

This ELR is considered to be an end of project evaluation and therefore the overall objective will be to focus more on the effectiveness, impact, sustainability and replicability (see approach outline in DI330.1). Recommendations will focus on what actions may be necessary to consolidate impact and improve the chances of sustainability, possibly through the development of a carefully considered Project Exit Plan.

The MLE Team will visit all 4 sites– Larantuka, East Lombok and Benoa Bali – and hold meetings with vessel owners, coordinators, skippers, crew, as well as Government SAR / MCS staff and project partners to gain relevant feedback as required.

It should be noted that, , in contrast to the earlier Midline Evaluation, this Endline Evaluation will be undertaken jointly with MMAF. This approach is intended to facilitate hand over of the M&E elements to the government, especially if a future legacy evaluation is to be conducted.

Evaluation Objectives

The main purpose of the evaluation is to assess the degree to which the project objectives have been achieved. The assessment will investigate whether the project has achieved its expected outcomes and impacts and specifically whether the intended flow of benefits has been generated and utilised by the intended target groups and beneficiaries, and if so, to what degree. Lessons learnt, and experience gained should then be integrated into the on-going project and used in the planning of future projects to improve aid budget efficiency and impact.

Directly linked to this project, the documentation of success or otherwise of development goals, lessons learnt and recommendations for future work to both sustain and replicate the systems developed in other Fishery Management Areas in Indonesia will be explored.

The objective of evaluation related activities in this IPP project is to check the following outcomes:

1. Improved safety of life, family welfare and financial resilience of fishers through the adoption of VMS/Value added services
2. More effective monitoring and enforcement infrastructure and processes operationalised and adopted by the KKP to reduce illegal fishing in Indonesian waters increasing border control security.
3. The completion of a tested and fully developed low cost affordable VMS/communication model for use with <30 GT vessels that is fully integrated into the KKP's MCS system for IUU monitoring and surveillance

A key sustainability question is whether all the necessary technical, financial, economic and social ingredients are in place to sustain and replicate the piloted VMS/satellite approach managed by KKP in all FMAs in Indonesia in an integrated national MCS approach.

Methodology

The Evaluation is split into 2 sections (as reflected in Caribou's guidelines for Evaluation) including (1) Process Evaluation and(2) Impact Evaluation. A description of tools and data requirements are also listed in this section.

Process Evaluation

This section focuses on the Relevance of the project (design in relation to needs), the efficiency of implementation (inputs into outputs) and the effectiveness achieved in terms of quality of outputs and their initial use by both project partners and end-users or beneficiaries.

Much of the inputs and expenditure was front loaded into the first year of the project as per project plan. The Mid Line Evaluation report documented in great detail the project relevance, efficiency (by key result) and effectiveness (the delivery of outputs and subsequent use).

It is envisaged that only a summary of the key points raised in the Mid Line Review will be presented and reviewed with adjustments made where necessary. Instead, the evaluation will focus more on the progress in implementation made with the "Sustainability Plan (August 2018 to June 2019)"[24]– and assess the related efficiency and effectiveness of work undertaken since the Mid Line Evaluation.

The following question areas in Table 2 below provide an overview and guidance under different evaluation criteria headings with regard to the delivery of Key Results as specified in the Project LFA, as follows:

Key Result 1: Project initiation design & procurement: IDP solution designed and shipped to Indonesia

Key Result 2: PointTrek installed and operational in pilot vessels <30 GT & >30 GT in selected port areas

Key Result 3: Improved regulatory environment for Monitoring Control and Surveillance in Indonesian fisheries

Key Result 4: VMS technology developed for IUU detection, MCS purposes & Government staff trained in its use

Key Result 5: Demand and Supply conditions researched, and business model defined

Key Result 6: Business model produced and shared to consolidate sustainability potential

Key Result 7: Knowledge sharing media materials produced and shared with target stakeholders and partners

Key Result 8: M&E manuals, documents and reports produced in a timely manner

Table 2: Process Questions, Judgement Criteria and Indicators

Evaluation Questions	Judgement criteria	Indicators
Relevance **1. Has the requirement for satellite-based communications and VMS data provision changed since project conception?**	• Availability and use of telecommunication equipment • VMS data for <30 GT vessels demanded by control authorities	• Change in use of satellite phones and SSB radio since baseline. • No. of copies of PointTrek-enabled software installed in PSDKP.
Efficiency **1. Were KPIs, deliverables and milestones on time and on budget?**	• Timing of KPIs and dependencies	• Analysis of intended / actual deliveries and consequences.

[24] see Annex 1

Evaluation Questions	Judgement criteria	Indicators
Effectiveness **1. How did the consortium work together?** **2. What do consortium members, end users and others think about how the project was implemented?**	• Degree of joint coordination and planning. • Views of key project partners and end users.	• No. of joint planning meetings. • Qualitative semi-structured attitudinal survey

The Team will make use of questionnaires sent project partners in the Mid Line Evaluation for updates regarding implementation efficiency and effectiveness.

The Long Term IPP plan will be updated with findings as in the Mid Line Evaluation.

Impact Evaluation

With the emphasis of this evaluation placed on Effectiveness, Impact, Sustainability and Replicability at project end, this section will be dealt with in a comprehensive and thorough manner.

As part of the evidence based approach to evaluation, the following impact evaluation questions have been formulated to influence decisions in what data to collect, its analysis and how it is reported.

Table 3: Evaluation Questions, Judgement Criteria and Indicators

Evaluation Questions	Judgement criteria	Indicators
Effectiveness 1. Did the Project meet the expectations of the beneficiaries? 2. How well have the use of outputs led to tangible outcomes for the target groups and beneficiaries?	• Level of equipment usage over project maintained. • Improved market access and prices	• Transmission records • Price and market survey data
Impact 1. What impact has the project had in attaining the project objectives and goals?	• Fishing sector benefits from improved operational practises and 'safer life at sea' (SOLAS) and increased margins/ welfare through the adoption of VMS-based positional and communication technology	• No. of HHs impacted directly by Inmarsat Indonesia project • No. of days lost per quarter through illness / injury in the beneficiary fleet. • 10% increase in boat owner profit margins • Increase in fishing crew income per trip

Evaluation Questions	Judgement criteria	Indicators
Sustainability 1. What is the likelihood of a continuation of the flow of benefits provided by the project to its target beneficiaries? 2. Is there sufficient Government support (funding and policy)? 3. Are the flow of benefits viable and sustainable from an economic or financial perspective? 4. Is the technology suitable and appropriate – can it be replicated nationwide?	1. Ownership by beneficiaries 2. Policy support 3. Appropriate technology 4. Environmental Protection 5. Socio-cultural issues 6. Gender 7. Institutional & management capacity 8. Economic and Financial viability	Qualitative analysis based on feedback from beneficiary groups etc.
Replication 1. Potential to upscale within existing FMAs for both weight class 2. Potential to replicate the MCS system to cover new FMAs in Indonesia 3. Scalability aspects of low cost package developed during the project in the market place.	Assessment using a weighting system (Poor, Moderate, Good and Very Good) to determine the future potential based on existing findings	Judgemental assessment

By definition, Impact and Sustainability are measured post project after sufficient time has transpired to demonstrate whether outcomes from the project are still providing benefits and being sustained by project beneficiaries. Although it is too early to evaluate impact and sustainability aspects fully at this stage, it may be possible to comment on the likelihood that impact will be achieved and assess sustainability through the use of sustainability criteria.

Question areas

Specific question areas for the ELR, data sources and indicators are given below:

Table 2: Data collection and indicators for End Line Evaluation

Criteria	END LINE EVALUATION
KPI 1: Safety and security of mid-sized vessels (20-30GT) and larger (30 GT+) fishing vessels improved using satellite-based communication and VMS technology	Progress made to date; experience gained in identifying SOLAS and actions taken to address distress calls. # days lost through injury # lives saved due to VMS
KPI 2: Welfare and livelihoods of fishers and their dependents improved using satellite-based communication and VMS technology	Progress made to date; Use of VMS installed by boat owners for communications (based on SMS data) and benefits arising. Data from the Cost-Earnings survey data - Fish catch (kgs per trip) - Average Gross Margin (net income per trip) – (IRD per trip) - Days at sea (days) - Income per crew member per trip (IDR/trip) - Fuel use per trip (cans/per trip)

Criteria	END LINE EVALUATION
KPI 3: Levels of IUU fishing reduced through targeted monitoring, control and surveillance (MCS) resulting from the use of satellite-based communication and VMS technology	Progress made to date; how well is the new system being used? Any shortcomings from technical or capability/skills? what are the changes in detection of IUU vessels; apprehension/detention rates, court cases and fines etc Progress made to date; changes in number of non-compliant vessels in MPAs/FMAs. Feedback from Patrol Agency and key KKP organisations
KPI 4: Improved capacity to plan and implement monitoring, control and surveillance (MCS) within the national and local government	Progress made to date; use of the newly installed dashboard and algorithms together with integrated radar, AIS and other systems and emerging effects generated. Is training sufficient? Comparison with baseline for key indicators.
KPI 5: A low cost affordable VMS / Communication model relevant to <30GT vessels that is integrated into the Indonesian MCS system is fully tested and completed with successes and outcomes shared widely with the development community (NEW)	Technical and commercial model with low cost package for both vessels completed and ready for roll out; progress achieved in changes made to the regulatory framework to include <30 GT vessels for mandatory VMS use; and progress made in the business case proposal for piloted and improved MCS equipment for use by KKP and approval/adoption of its use by KKP ?

A description of the data collection methods for the RLE is given below:

Table 3: Data collection tools and methods for the End Line Evaluation

Data collection tools /methods	Use
Key Informant Interviews	Selected key informants at community level (e.g. Village headmen, head of community level fisheries organisations; head or NGOs/other projects, fish marketing companies or small firms; Collectors and traders etc Managers of Marine Protected Areas etc
Focused Group Discussions (FGDs)	Used to gather qualitative information from group work with fishing HHs covering a range of topics related to SOLAS, illegal fishing; fishing crew welfare; fishermen livelihoods; fish marketing (input supply and fish selling) strategies; expected benefits of improved communication etc
Fish Boat Sample Surveys	Quantitative data collected in a formal survey with a sample of pilot fishermen covering a range of indicators (KPI1 to KPI 2) including fishing decision making, fish marketing decision making, fish and input prices, fishing boat catch margins etc; SOLAS, perceived benefits of VMS communication etc
SMS / VMS data sampling	There are three potential sources of electronic data that might be used for M&E purposes: 1. **SMS message content** – messages send to and from fishing vessels could be analysed in order to categorise them into key message types e.g. (1) Emergency declaration (life-threating, vessel at risk of sinking); (2) Non-emergency declaration (mechanical issue, crew injury, etc); (3) Non-emergency declaration (ceasing fishing, heaving to, returning to port) due to weather; (4) Emergency response; (5) Non-

Data collection tools /methods	Use
	emergency response; (6) Fishing opportunities (vessel to vessel); (7) 3rd party IUU incident observed/reported; (8) Catch / landing / market details; (9) Logistics (ice, bait, food inputs); and (10) Social exchange. 2. **SOS broadcasts**; and 3. **VMS geo-fencing data**.
MCS System review – visits to all government agencies / NGO/ fisheries organisations involved in MCS	A detailed review of pilot sentinel and control fleet information; existing MCS system and gathering of data for key indicators related to SOLAS, emergencies, IUU detection and apprehension etc. Problems and Constraints. Data collected at baseline, midline and endline surveys An assessment of the success of integration of the new system within the KKP with recommendations in how to consolidate impacts and sustainability.

M&E Team

The following team (to be confirmed) will undertake the evaluation:

Table 4: Proposed Schedule

Name	Title	Company
Tim Huntington	Fisheries / M&E expert (TL)	Poseidon
Willie Bourne	M&E specialist	
Priska Widyastuti	Assistant Marine Leader	Hatfield
Sigit Heru Prasetya	M&E field surveyor	
Gede Mahendra	M&E field surveyor	

Timing and Workplan

The MLE will be undertaken between over 21 July – 02 August 2019. The draft report will be submitted by 16 August 2019. The proposed agenda of the trip is shown in the table below.

Table 5: Proposed Schedule

No.	Time	Description	Location
Bali			
1.	Monday, 22 July 2019	MLE training workshop to review methodology and make final logistical arrangements (Bali)	Bali
Team 1: Lombok and **Team 2: Larantuka**			
2.	Tuesday, 23 July 2019	On site: FGDs and interviews (field test)	Bali
3.	Wednesday, 24 July 2019	On site: FGDs and interviews	Lombok & Larantuka
4.	Thursday, 25 July 2019	On site: FGDs and interviews	
5.	Friday, 26 July 2019	On site: FGDs and interviews	

6.	Saturday, 27 July 2019	Return to Bali	Bali
7.	Sunday, 28 July 2019	Report writing	Bali
8.	Monday, 29 July 2019	Report writing	Bali
9.	Tuesday 30 July 2019	Fly to Jakarta	Jakarta
10.	Wednesday 31 July 2019	Preparation for workshop	Jakarta
11.	Thursday, 01 August 2019	End Line Evaluation Workshop Jakarta	Jakarta
12.	Friday, 02 August 2019	Final report writing & debriefing	Jakarta

Dissemination of results - Workshop

The team will then hold a half-day workshop with senior MMAF officers in Jakarta to (i) present the End Line Evaluation findings and (ii) discuss key recommendations and lessons learnt from implementation to date.

Additionally, the team aims to compile (a) stories and issues that can be fed into the communications programme to boost MMAF' s (and our) visibility, and (b) think about sustainability issues, either in initial tentative discussions with MMAF or potentially start identifying other organizations who might help fund this and follow on projects.

The proposed agenda of the workshop is shown in Table 6 below.

Table 6: Workshop Agenda

No.	Time	Description
1.	8.30 – 8.45	Registration
2.	8.45 – 9.00	Welcome and opening
3.	9.00 – 10.00	Presentation of key End Line Evaluation findings and results: Outcome 1 (Safety at sea) and Outcome 2 (Improved Livelihoods)
4.	10.00 – 11.00	Presentation of Key End Line Evaluation findings and results: Outcome 3: Illegal fishing (IUU) and Outcome 4: Improved Monitoring Control and Surveillance (MCS); and Outcome 5: A low cost affordable VMS/Communication model relevant to <30 GT vessels that is integrated and adopted into the Indonesian MCS system
5.	11.00 – 12.00	Discussion of findings, recommendations and lessons learnt
6.	12.00 – 12.30	Next step and closing

Findings will be consolidated and presented in a report "End line M&E Report" (DI330.7) would be produced by the M&E team at Poseidon. This report would include the headings (Table of Content) shown overleaf.

Indicative table of Contents

Quality and Ethical Standards for Data Collection

Our principles for ensuring high quality and ethically sound data collection include the following:

1. **Respect**: All evidence generating activities should ensure respect for all persons. Respect demands that individuals be treated as autonomous agents. An autonomous agent is an individual capable of deliberation about personal goals and of acting under the direction of such deliberation. To respect autonomy is to give weight to autonomous persons' values, preferences, and beliefs and to recognise their capability for self-legislation, their ability to make judgments, to state their opinions and to make choices.

   In respecting an individual's autonomy, recognition is required that personal agency may be limited due to age, circumstance or personal capacities. In this context, respect for autonomy requires recognition of capabilities, power differentials and the degree of agency that an individual may have. In the context of children and other vulnerable groups respectful evidence generation needs to be situated in their lived experience with recognizing the reality of unequal relationships of power that frequently exist, creating environments that support these individual's personal agency and dignity.

2. **Beneficence:** The principle of beneficence refers to the requirement that actions within evidence generating activities promote the well-being of individuals, communities or society as a whole. The principle of beneficence requires the identification of clear benefits likely to arise from evidence and to reconsider proceeding if these cannot be articulated. Beneficence includes the concept of reciprocity, whereby the evidence generated is conveyed back to the participants so that they may triangulate findings, contextualize their participation and potentially gain from the knowledge disseminated.

3. **Non-maleficence: T**he principle of non-maleficence, doing no harm, requires avoiding harm or injury to participants, both through acts of commission or omission. While the primary purpose of research, evaluation and data collection and analysis is to generate new evidence, this goal should never take precedence over the rights of individual participants. Non-maleficence requires an examination of the profile, competencies and skills of researchers and enumerators to ensure no harm comes to participants by virtue of inappropriate, unskilled or incompetent researchers or enumerators. It also requires explicit consideration of means to ensure the privacy of participants, their safety and any possible negative impacts arising from participation.

4. **Justice**: The principle of justice requires that consideration is given to who benefits and who bares the burden of the evidence generation. This requires that due reflection is given to determining the appropriateness of proposed methods of selecting participants. Selection should not result in unjust distributions of the burdens and benefits of evidence generation. Such considerations are required to avoid the injustice that arises from social, racial, sexual, and cultural biases institutionalized in society.

Appendix C: Meetings held, and people met

Date	Name	Organisation	Position
22 July 2019	Bapak Nuqman	Pangkalan PSDKP Benoa	Head Section of Infrastructure
	Bapak Andri		Inspector staff
	Ibu Isniani		Junior Inspector
23 July 2019	Pak Agung	User	Vessels Coordinator
	Pak Nyoman		Vessels Coordinator
	Nasaruddin	Nurliajaya	Captain
	Raslin	Starmild 09	Captain
	Fariz	Sisfo	Marketing Manager
	Julian		Staff
	Ferry		Staff
24 July 2019	Syahril Asmari	Adia Bali 18	Captain
	Rusman	Aidil Hidayah	Captain
	Hilmar Dayton	PT Primo Indo	Vessel coordinator / Chief of Pole & Line Association of Larantuka
25 July 2019	Lucas Papernaik	PT Primo Indo Ikan	Owner
	Sumitro	PT Okishin	Vessel coordinator
	Mohamad SH	Indonesia Navy	Staff
	Rachmad Sholeh W	PSDKP	Staff
	Krisnawan Nindito		Staff
	Muhamad Saleh Belang	BPBDD - National Agency for Disaster Countermeasure at Regency Level	Staff
	Damrah Mustapa	DKP Flores Tuna	Head of surveillance department
26 July 2019	Bapak Yuliono	Satwas PSDKP Lombok Timur	Coordinator
	Bapak Guntur		Inspector & Admin staff
	Bapak Majid		Inspector & Investigator staff
	Bapak Hanung		Inspector & Admin staff
	Bapak Hari		Inspector & Admin staff
	Bapak Sholeh	CV Lautan Mas	Owner
	Bapak Slamet	Syahbandar Perikanan Labuhan Lombok	Head Section
	Bapak Herman	Syahbandar Perikanan Labuhan Lombok	Staff Verificator
	Willie labune	Flotim 24	Vessel coordinator
	Hasbulah		Captain
	Cromen	Flotim 4	Vessel coordinator
	Stefanus Masang Kerans	Flotim 07	Vessel coordinator
	Fransiskus Sina Kedang	Flotim 09	Vessel coordinator
	Joko Prasetyo	Flotim 24	Senior vessel crew
	Ani Boleng	Nelayan Bhakti 53	Vessel coordinator
	Subhan	Sisfo	Technician

Date	Name	Organisation	Position
30 July 2019	Ridwan Nurzeha	PSDKP, Jakarta	VMS Analyst
	Andrew Bassford	Marine Change	CEO
01 August 2019	Workshop in Bogor – see **Appendix F: Endline M&E Workshop - Team Presentation**		

Appendix D: Cost Earnings Methodology and Results

Background

This report documents the Cost -Earnings Approach developed by the Poseidon M&E Team to provide "counter-factual" evidence in a sample survey of trip income data from fishing boats with and without VMS /communication equipment was prepared as part of the End Line Evaluation (21 July to 2 August 2019). The monthly survey collects data from Sentinel (i.e pilot boats with VMS equipment) and Control vessels (those who do not have the equipment on board) in order to identify the degree of incremental benefit from the use of Pointrek VMS+ equipment.

Data for a range of fishing and income data is analysed and compared between the two treatments from vessels the handline fishery in Lombok and those from the Pole & line fishery in Larantuka.

This paper generates information for 5 key indicators that support Outcome 2: "Welfare and livelihoods of fishers and their dependents improved using satellite-based communication and VMS technology" including 5 LFA indicators:

OC2-5: Increased fish catches (kgs/trip)
OC2-6: Increased gross margins per trip (OC2-3 LFA)
OC2-7: Increased fish catch share income amongst crew members
OC2-8: Reduced time (days) at sea
OC2-9: Reduced fuel usage (cans of fuel)

2.0 C-E Survey Purpose

It is anticipated that the use of the 2-way communication between boat captains and their owners/ other company vessels leads to fishing or business-related fishing decision making that:

1. increases the efficiency of fishing (less time at sea, lower fuel costs); and
2. increases trip margins through reduced costs for inputs and higher prices through use of market data;
3. Improved logistics and landing management.

The purpose is to identify, with comparison of data between selected pilot "sentinel" vessels with "control" boats (Counter-factual), how the use of SMS information leads to more efficient fishing, increased income, reduced costs and increased crew income.

3.0 Methodology

3.1 Approach

The data collection approach has modified significantly since the baseline survey undertaken in October / November 2017 at the time of installation and collection of the Vessel Baseline Registration census.

In the initial approach devised and documented in DI-330.2 Process for Conducting Baseline, Midline and Endline Assessments report, trip data from 40 pilot Sentinel boats from 2 weight classes (<30 and >30 GT) and 20 Control boats would be monitored, but on a quarterly basis with a mixture of fishing gear from Benoa, Lombok and Larantuka.

However, from experience gained 2 reviews were undertaken in February and early April 2018 with the result that significant changes were introduced in a revised Sampling Data Collection Approach documented in April 2018, for the following reasons:

1. Benoa was dropped as it was not possible to find Control Boats, so vessels from only Lombok and Larantuka ports would be monitored
2. The fishing period December to April when fishing is undertaken only during spells of good weather, it proved difficult to get samples. There were also many trip reports with negative margins
3. Quarterly data was not sufficient in terms of frequency and number of trip reports submitted. A decision was made to collect trip data for both Sentinel and Control vessels on a monthly basis.
4. Data would now be collected for Sentinel and Control purposes from boats with similar characteristics - size, weight, holding/storage, fishing gear, species targeted etc.
5. A difficulty was encountered in finding vessels (who do not benefit from VMS) to give their information and agree to being a “Control boat” in project. This took time to organise
6. Sample size adjusted in Lombok (up to 10 Sentinel / 5 control) and Larantuka (up to 10 sentinel; 5 control)

A trip Cost-Earnings (C-E) template was developed to capture key catch, income, costs and benefit sharing information parameters for each vessel’s fishing trip monitored. The spreadsheet, following experience in data collection has been modified and improved reducing collection, data entry and time in analysis. Local enumerators collect data which is inserted into a spreadsheet e.g. ”Lombok Sentinel August”, in which financial and catch data is averaged automatically.

Once checked, data is uploaded on to the Master File for all four treatments, including a summary of average monthly data from Lombok and Larantuka for both Sentinel and Control fleets. This master file now forms the basis for analysis and comparison of data sets.

As a result of these changes in early 2018, the M&E team was able to produce some solid data Cost-Earnings data from April 2018 to June 2019.

3.2 Fishery characteristic Sample Size

The Lombok handline fleet targets yellow fin tunas on trips lasting between 13 to 15 days with around 10-14 days fishing, usually crewed by a captain and 4 crew members. Boats are between 20 – 30 GTs with fish catch storage of between 7-9 GT. Handline boats tend to fish off FADs and main use of fuel is to travel from port to FADs and back. The Lombok handline fishing season is similar to Benoa in Bali. The Low Season is from January to March due to bad weather. The High Season is marked by the catch of large tunas at the end of March to early May, after which boats target both large tuna and skipjack until early August. Peak fishing is between September and November.

From data collected between April 2018 and June 2019, boats (sentinel & control boats combined) from Lombok caught an average of 406 kgs of yellow fin tuna per trip, of which 38% was grade A, but worryingly 55% were grade E or baby tuna. An average handline boat caught 1,484 kgs of skipjack per trip of which 65% was grade A and B).

The pole and line fleet in Larantuka are on, slightly smaller but faster boats (20-25 GT) with a smaller fish catch storage of between 4 to 7 GTs hold size. Crew size is between 13-15 members and fishing trips last 2 - 3 days with 1-2 day fishing. Fuel consumption is relatively high as boats chase free schools mainly Skipjack tuna. The main season in Larantuka is from April to June, then skipjack from July to December with peak fishing between September to November. Traditionally, pole and line vessels face

difficulty from December onwards to buy baitfish from the bait fishing boats. Many boats rest up between January to March due to poor weather and difficulty in buying baitfish.

From data collected between April 2018 and June 2019, pole and line boats (both sentinel & control boats combined) from Larantuka caught an average of 376 kgs of yellow fin tuna per trip, of which 14% was grade A, but worryingly 76 % were baby tuna. As these boats target the smaller free schools of skipjack, unfortunately small baby yellow fin tuna are also caught. An average handline boat caught 2,012 kgs of skipjack per trip of which 95% was grade A).

3.3 Sample Size

In Lombok there was an average number of six sentinel vessels and two control vessels available for sampling, and in Larantuka four sentinel and control vessels available for sampling. Table 1 below provides an overview of the total number of sample trip data collected between September 2017 to July 2019, showing that nearly 300 vessels and 450 trips were sampled in total.

Table 1: Cost -Earnings sample trip data collection by treatment September 2017 to June 2019

Site	treatment	No boat samples	No. trips collected	No NEGATIVE GM trip	% negative income trips
LOMBOK	**Sentinel**	104	109	35	**32%**
LOMBOK	**Control**	40	45	10	**22%**
LARANTUKA	**Sentinel**	92	174	22	**13%**
LARANTUKA	**Control**	58	123	15	**12%**
TOTAL		294	451	82	**18%**

A total of 294 boat samples (both Sentinel and Control fleet) was recorded between September 2017 and June 2019. Initially, trip samples were gathered in the first 2 weeks of each month. As Lombok boats fish for up to 14 days, on average only 1 trip sample is gathered each month, but due to weather conditions, the Hatfield data collection team would collect data when it was possible at any time of the month. The short 2 day trip for pole and line vessels in Larantuka means that more trip samples may be gathered in the first 2 weeks of each month, up to a maximum of 3 trips per boat. Hence more trip data has been collected from the Larantuka sample fleet giving 297 trips recorded from 160 boat samples over the data collection period.

During this time some 82 negative gross margin trips (where costs have exceeded income from fish sold) equally 18% of all trips recorded. More negative trip margins were recorded from the Lombok Sentinel fleet especially between December and April (Low season) when catches were poor. Fewer trip margins recorded were negative from Larantuka during this period.

3.4 Key indicators

As presented above, indicators monitored in this study (details below under results) and used directly in the IPP LFA include the following:

OC2-5: Increased fish catches (kgs/trip)
OC2-6: Increased gross margins per trip (OC2-3 LFA)
OC2-7: Increased fish catch share income amongst crew members
OC2-8: Reduced time (days) at sea
OC2-9: Reduced fuel usage (cans of fuel)

Results are presented for the period April 2018 to June 2019 (15 months)

4.0 Results

4.1 Increased fish catches (kgs/trip) – (OC2-5 LFA)

Description: Vessels with VMS/Value added Communication equipment are able to seek information from Vessel Coordinators on where to fish (FADs) based on feedback given by other vessels. This results in increased fish catches compared to Control Boats.

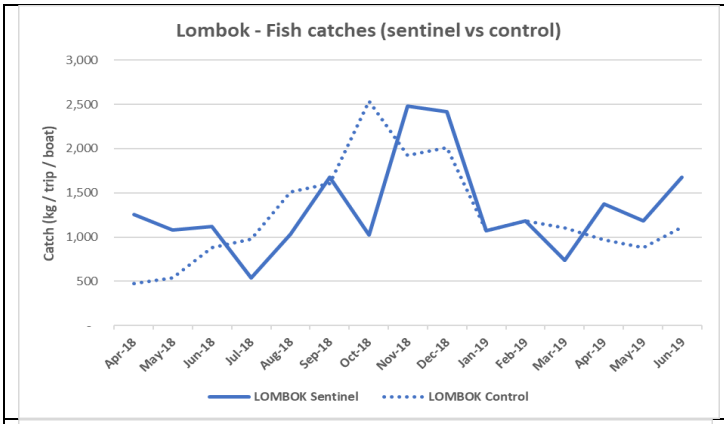
Measurement: Comparison of fish catches per trip between pilot & control boats.

Summary figures for time series of April 2018 to June 2019:

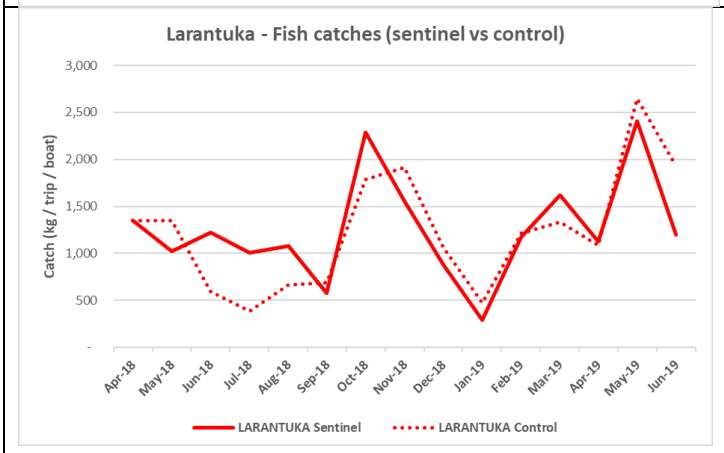
Site	Treatment	Average catch kgs/trip	Percent
LOMBOK	Sentinel	1,324	
LOMBOK	Control	1,252	5.76%
LARANTUKA	Sentinel	1,252	
LARANTUKA	Control	1,233	1.59%

1. For both locations, the average fish catch was higher for sentinel than the control boats fleet. but with a high degree of variability by season and by fleet.
2. Lombok handline fishery: With VMS+, a higher catch was landed for Sentinel Fleet boats compared to Control boats (Average 1,324 kgs compared to 1,252 kgs/trip) some 5.76 % higher
3. Larantuka Pole & Line fishery: Higher catch with VMS+ of 1,252 kgs /trip compared to 1,233 kgs per trip (1.6 % higher).

Time series graphs: April 2018 to June 2019



Lombok fleet:
1. Peak fishing between Oct-Dec
2. Low season Jan – Mar (weather)
3. Mainly one control vessel



Larantuka fleet:
1. two high seasons – Sept to Dec and April to June (although not clear trend in 2018)
2. low season Jan to March (weather and turbidity)

4.3 Increased gross margins per trip (OC2-6 LFA)

Description: Increase in the average net income / gross margin for fishing trip (IDR/trip) – based on higher catches (where to fish) and lower costs (logistics, time at sea, less fuel used etc)

Measurement: Gross output is calculated (fish kg x price) LESS costs = gross margin per trip

Summary figures for time series of April 2018 to June 2019:

Site	Treatment	Average GM/trip-IDR	Percent
LOMBOK	Sentinel	4,980,122	
LOMBOK	Control	3,992,480	24.74%
LARANTUKA	Sentinel	13,792,124	
LARANTUKA	Control	13,594,003	1.46%

1. Fishing gross margin per trip in Lombok (over 14 days) is much lower than that found in Larantuka (2 to 3 day trip) with some 4 to 5 million IDR in Lombok per trip compared to 13.5 million to 13.8 million IDR per trip in Lombok.

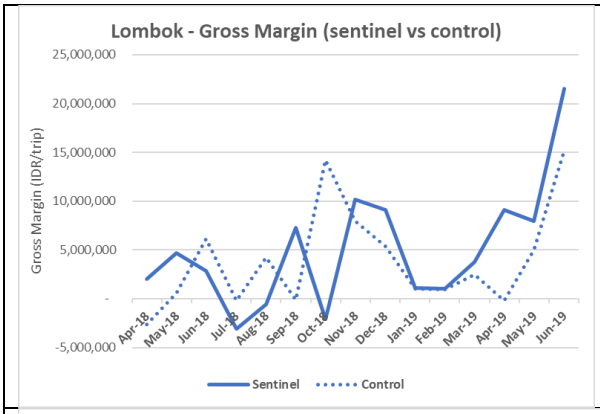
2. The gross margins recorded in Lombok give a very poor reflection of profitability that raises questions over the long term viability of the handline fishery in Lombok.

3. Lombok sentinel fleet more gross margin per trip than control boats (25%)

4. Sentinel fleet in Larantuka 1.5% more gross margin per trip than control boats.

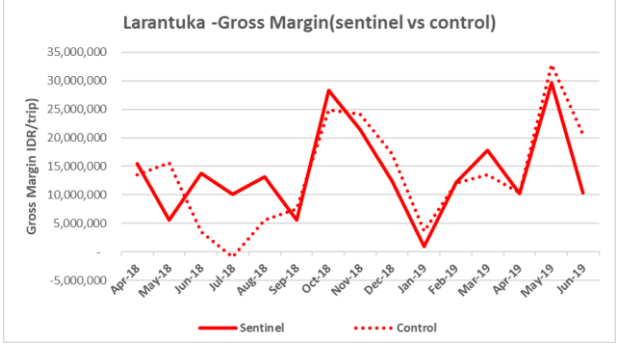
5. The average GM closely linked to catch size in LTUKA. The high average GM in Lombok in June 2019 was caused by good catches of grade A yellow fin tuna sold at high prices.

Time series graphs: April 2018 to June 2019



Lombok fleet:

1. Some negative gross margins recorded for trips in some months(July to August 2018 and October 2018) due to poor catches
2. High GM income in June 2018 linked to both catch size and high proportion of Grade A YFT and skipjack caught by sentinel fleet boats



Larantuka fleet:

1. Fishing gross margin per trip closely aligned with fish catch (kgs per trip) giving 2 peaks between September to December and April to June.

Conclusion:

1. Lombok boats make less money (over 14 days-handline) than Larantuka boats (2 days; pole & line)
2. The profitability of handline fishing appears marginal / precarious. Larantuka fishery more profitable/lucrative
3. Breakeven catch for vessels is between 800 – 1,000 kgs of fish / trip to cover costs.
4. As a general trend, gross margins are linked to volume of fish catch although in some cases much depends on the type (e.g. YFT compared to SKJ) and grade of fish caught (e.g grade A tuna compared to juvenile fish).

4.4 Increased fish catch share income amongst crew members

Description: Vessels that use Communication equipment on board will have higher GM per trip and therefore higher income per day for each crew member (IDR)

Measurement: Breakdown of income ratio:

Lombok – 50% Owner; 30% Captain and 20% crew – 4 crew members;

Larantuka - 45% owner; 10% captain and 45% crew – 14 crew members;

In Lombok, Vessel Coordinators manage their boats over a season and have a practice called “Cashing Up”. This could be over a period of 10 trips or so. In order to “Cash-up” all the income generated from fish sales less costs of supplies and agents commission (often around 8% of catch total) less any money advanced to captain and crew are deducted.

In Larantuka, crew are paid in a 22 day cycle linked to the lunar calendar (full moon).

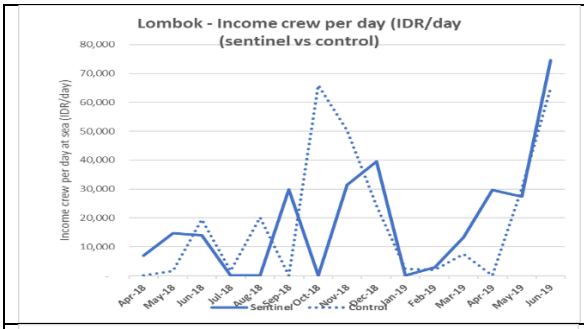
This means that in reality crew are not paid per trip. This is important if there are “negative income trips” as any loss is balanced out by positive trip income. This calculation does not also cover the time back at port in landing catch, cleaning the holds and preparing to return to sea (usually around 3 to 4 days for handline boats but less for pole and line boats).

The average income per crew member by month is given below with income per day and per trip calculated. The calculation did not include trips with negative gross margins in the month as (realistically) losses on trips are borne by the owner and not by the crew members.

Site	Treatment	Average income day per crew member (IDR/day)	Percent
LOMBOK	Sentinel	20,313	
LOMBOK	Control	19,383	4.80%
LARANTUKA	Sentinel	198,041	
LARANTUKA	Control	194,129	2.02%

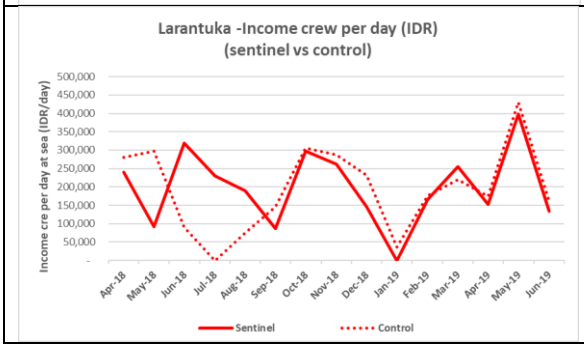
1. Although Gross Margin per trip was higher for Lombok Sentinel Fleet, the average income per day was higher than Control fleet (4.8 %) even though more time was spent at sea (see OC-2-8). Income per day is considered very low (GBP 1.0 per day at sea per crew member)
2. Income per crew per day for Larantuka Sentinel fleet was 2% higher than the Control fleet
3. Income in Larantuka is significantly higher than Lombok (200,000 IDR per day compared with 20,000 IDR per day) which reflects both shorter trips and time at sea and higher profitability per trip (as demonstrated above).

Time series graphs:



Lombok:

1. Crew income broadly tracks the high and low fishing seasons for both sentinel and control fleets



Larantuka:

1. Income per crew member for control and sentinel fleet vessels are fairly closely correlated (especially for the months of September 2018 to June 2019)

4.5 Reduced time (days) at sea

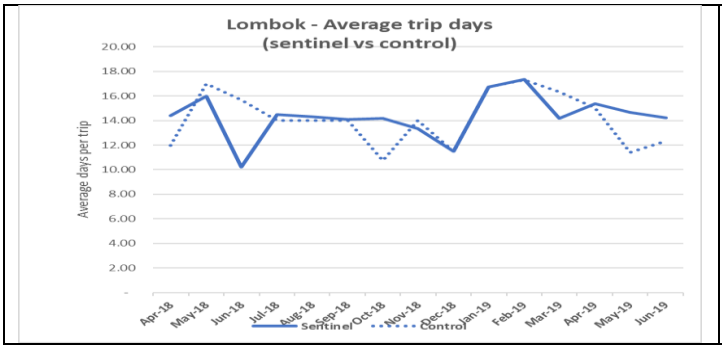
Description: Vessels with VMS+ should, through sharing of information on where fish are (location given by Vessel Coordinators) – result in boats spending less time at sea than control boats.

Measurement: Comparison of days at spent at sea between Sentinel and Control boats

Site	Treatment	Average time at sea	percent
LOMBOK	Sentinel	14.34	
LOMBOK	Control	14.14	-1.43%
LARANTUKA	Sentinel	2.43	
LARANTUKA	Control	2.44	0.18%

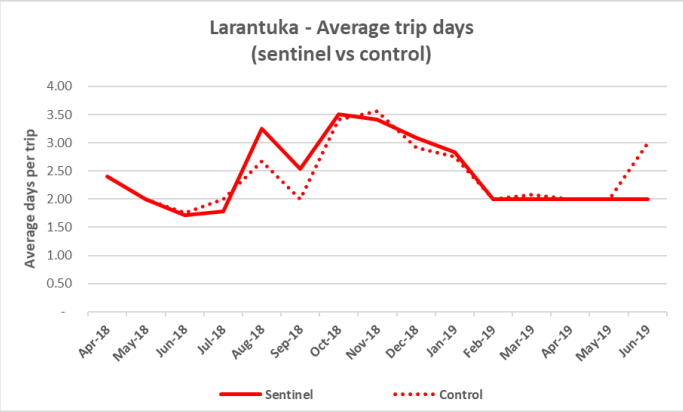
1. Lombok sentinel fleet used slightly more cans of fuel than control boats (1.4% more)
2. Larantuka sentinel fleet incurred a slight cost saving (2.18% less fuel) than control boats

Time series graphs:



Lombok fleet:

1. More time spent fishing between January to March compared to other times of year (14 to 17 days) when weather is poor and water with high turbidity.



Larantuka fleet:

1. Longer trips in the peak season of September to November, as boats try to maximise fishing effort to secure large catches.

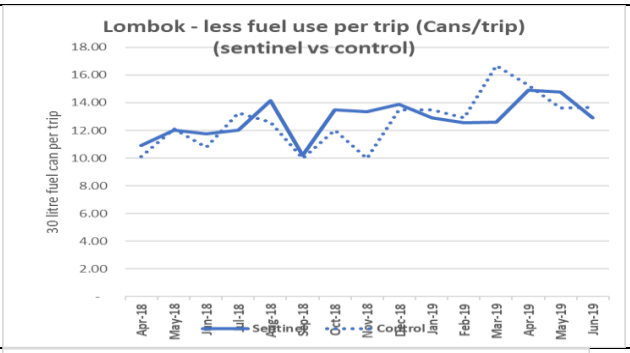
4.6 Reduced fuel usage (cans of fuel)

Description: Vessels with VMS/Value added Communication equipment results in less fuel consumption as Vessel coordinators use SMS to redirect boats to find fish leading to a reduction in fuel costs

Measurement: The number of empty cans of fuel offloaded /replaced on return to port is measured giving an approximation of the amount of fuel used in each trip.

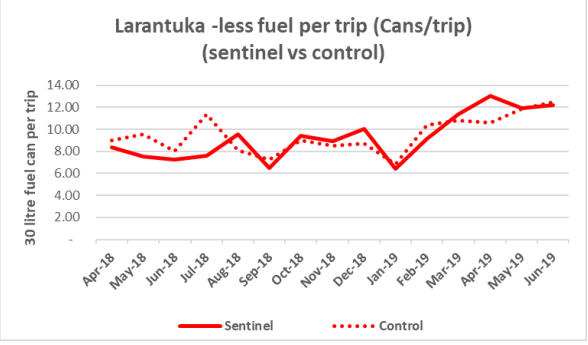
Site	Treatment	Less fuel per trip (30 Liter can/trip)	percent
LOMBOK	Sentinel	12.84	
LOMBOK	Control	12.66	-1.40%
LARANTUKA	Sentinel	9.29	
LARANTUKA	Control	9.50	2.18%

Time series graphs:



Lombok fleet:

1. Lombok Sentinel fleet spend slight more time at sea than the Control boats and therefore used slightly more fuel (1.4% more fuel)



Larantuka fleet:

1. Larantuka sentinel boats used slightly less fuel than control boats (2.18% less fuel), as they spent less time and effort looking for fish.

5.0 Conclusions

5.1 Conclusions and discussion on Outcome indicators

A summary of key findings from each indicator is given below:

Indicator	Summary findings
1. Fish catch (kgs per trip)	Higher catches noted from Sentinel boats compared to Control boats in Lombok (6% higher) and Larantuka (1.6% higher)
2. Average Gross Margin per trip (IRD per trip)	High variation in gross margin per trip; Lombok GMs appear poor and very marginal; Lombok Sentinel boats 25% more profitable Control boats; Larantuka Sentinel boats marginally more profitable than Control boats (1.5%) Catch weight important as is the type / grade / value of fish caught
3. Income per crew member per trip (IDR/trip)	Significantly higher crew incomes for Larantuka Pole and Line boats compared to Lombok handline boats. Crew members on Sentinel fleets made more per trip than Control boat crew (Lombok 4.8% more; Larantuka 2% more).
4. Days at sea (days)	Slightly more days spent at sea for Sentinel compared to Control fleet in Lombok (0.30 day per trip). Larantuka had very similar time at sea for both treatments.
5. Fuel use per trip (cans/per trip)	Marginally more fuel used by Sentinel boats compared to Control boats in Lombok (0.16 can per trip more) and less fuel used by Sentinel boats in Larantuka (0.2 can less fuel)

The data sets analysed over the 15 month period shows a slight improvement in efficiency for boats with VMS+ than the control boats without the value added communication equipment for the average catch per trip, average gross margin and catch income per crew member per trip.

Little difference was found between the two treatments for days spent at sea and fuel usage.

With further investigation it was found that there was a significant difference with boats that had high SMS usage over the 15 months in the sentinel fleet compared to those that had low usage. This is demonstrated by one boat from Larantuka, named Flotim 24, which had a very high SMS usage, that resulted in large differences in catch, net income and income per crew member compared to the control fleet – see table below:

Criteria	Lanatuka - Flotim 24	Larantuka Control fleet	Percent difference
Average catch kgs/trip	1,630	1,233	32%
Average GM/trip-IDR	18,148,413	13,594,003	34%
Average income day per crew member (IDR/day)	264,072	194,129	36%
Average time at sea (days/trip)	2.4	2.44	0%
Less fuel per trip (30 Liter can/trip)	11.3	9.5	-19%

1. Flotim 24 with high SMS use showed large benefits in terms of average catch per trip (32% higher), average GM per trip (34% higher) and average income per crew member compared to control fleet vessels (36%) compared to the Control fleet.
2. Flotim 24 had similar time at sea, but higher fuel use (19%).
3. The Flotim 24 Vessel owner[25] explained that he used the VMS+ to communicate frequently with his boat to help them find baitfish and to direct the boat to fishing areas where he knew – following calls from cell phone calls to his friends in Kupang – there were fish.

In conclusion, it is not whether you have VMS + SMS app on board or not, but it is whether you use it to your advantage to help find fish and assist with boat logistics and fish marketing (as demonstrated by Flotim 24). If the other boats in the sentinel fleet treatment do not use or rarely use the communication equipment onboard to guide the captains to areas where fish are, then in reality, these boats are like the control boats and as such, little difference in terms of catch and profitability will be noted.

Unfortunately, none of the sentinel fleet boats displayed high SMS use whilst at sea in Lombok, so no similar comparison in the Lombok fleet could be made.

Other advantages with the use of VMS+, as noted through interviews with vessel co-ordinators, vessel owners, captain and crew included the following:

- With communication of arrival time, the vessel coordinator or owners could arrange for landing of fish, logistics management (ice, fuel and supplies) and make arrangements for the supply of bait fish
- Time saved through more efficient logistical arrangements could result in an additional 1 to 2 trips per month in Larantuka in the high season (but not low season when fishing relied on the weather condition more). If this is the case, then the owner, captain and crew would benefit from an additional average GM of some 13 million IDR per month
- One crew member[26] on Flotim 24 said that he would not consider working on a boat without VMS+ as his monthly income would be much less (now he gets around 3 million IDR per 22 day cycle compared to 1.5 million on boats without VMS+)

5.2 Impact Indicator

Impact 1: The safety, productivity and food security of Indonesian fishers and their communities enhanced through the expansion and adoption of VMS

Indicator narrative: II1-4. Accumulated total additional vessel earning per trip for all vessels in pilot fleets from Lombok and Larantuka (total net benefit) from April 2018 to date compared to Control boats (GBP).

Calculation: difference in total average gross margin per trip between Sentinel and Control x No. of trips made each month x No. of pilot boats = total accumulated incremental net income for pilot boats between April 2018 and June 2019 (in Larantuka and Lombok and estimated for Benoa and Maumere).

[25] Willie Labina – vessel owner Flotim 24

[26] Joko Prasetyo – fishing master on Flotim 24

Table: Accumulated Incremental Net Income by pilot fleet/harbour (April 2018 - June 2019

Site	Fishery	No. of boats	Total incremental value IDR	Total incremental value GBP
LOMBOK	Handline	85	2,098,739,616	£122,347
BENOA	Handline	49	1,209,861,450	£70,529
LARANTUKA	Pole&Line	50	2,191,899,754	£127,778
MAUMERE	Pole&Line	11	482,217,946	£28,111
Total		195	5,982,718,766	£348,765

The total incremental income generated between April 2018 to June 2019 to pilot fleet was GBP 348,765 or 5.98 billion IDR (195 boats, 15 months benefit). This assumes that all the boats use VMS+ regularly on every trip.

Recommendation: It is recommended that at the time of the Legacy evaluation, in order to calculate the continuing total incremental benefit to the pilot boat fleet, that an assessment is made of the number of boats in the pilot fleets that still switch on the VMS and actively use SMS on most of their trips and any changes made to this calculation (in number of boats benefiting).

The key impact area will be those vessel owners / captains that now buy the monthly package for their fishing operations as from August 2019, there is no further project support in providing free SMS packages to pilot boats. They now have to pay for them.

Appendix E: Status of Management Responses to the Midline Evaluation (August 2018)

Recommendation	Management Response	Key Actions	Timeframe	person responsible	Status
Recommendation 1: The UK Space Agency ensure that all of its project managers are grounded in the basic rudiments of project M&E and the use of M&E information in project oversight and management functions.	unknown				
Recommendation 2: The UK Space Agency place more emphasis on the use of a Logical Framework Approach to project design in its Application Form that highlights the identification of Key Results to which identified work packages are directly linked and contribute to.	unknown				
Recommendation 3: The generic term 'VMS' as used by the project for the PointTrek equipment is both misleading and open to misinterpretation. An alternative term should be developed in its place provides a balanced and fair description of the equipment and its services	The Inmarsat IPP leadership team agree that this is indeed misleading.	A shorter term will be identified and used. Perhaps using simple product names (e.g. Pointrek, VMS+)	1 month	Steven Obaditch	closed
Recommendation 4: Inmarsat and partners (as it already in motion or planned) focus on improvements to PointTrek equipment and apps (e.g. to develop an interface with Department of Capture Fisheries for e-logbooks, a geo-fence system, weather apps, voice call protocols and solution to battery/power supply issues) in its final VMS solution package	The Inmarsat team agree but this is a commercial decision for each Inmarsat Service Provider. Inmarsat simply provides the communication system and the services are for the SP's to devise based on their market analysis	PT SISFO want to enhance their system including adding the Catch Reporting system to their control module rather than as an app. Catapult will provide some HCD assistance	1 year	Service Partners	closed

Recommendation	Management Response	Key Actions	Timeframe	person responsible	Status
Recommendation 5: Inmarsat and Partners target Vessel Co-ordinators and Fish Export Companies as the first segment in its marketing approach rather than captains and vessel owners (particularly in <30GT class) who may not fully appreciate the benefits generated in view of investment expenditure	The Inmarsat IPP team agree with this approach.	This approach was already identified and individuals now actively targeted. Inmarsat will pass information on to other SP's as they improve their products.	Complete	Steven Obaditch	closed
Recommendation 6: The handline fishery has demonstrated that information and cooperation fed via SMS and the broadband feed can improve fishing efficiency, especially when vessels are fishing as a cooperative group on FADs. This evolving experience needs to be captured and documented and developed into guidelines and advice for maximising fishing efficiency through better communication and data provision.	The Inmarsat IPP leadership team agree with this approach.	This approach was already identified and individuals now actively targeted. Inmarsat will pass information on to other SP's as they improve their fisheries products.	Ongoing	Steven Obaditch	closed
Recommendation 7: The project needs to continue efforts to demonstrate the potential benefits and cost-efficiencies of VMS in the < 30 GT domestic fleet monitoring, control and surveillance.	The Inmarsat team agree and takes all key recommendations from M&E reports into consideration and applies lessons learnt as required	Continue to monitor lessons learnt formally via forums like the Pole Line Association and larger events such as the Ocean 2018 conference	6 months	Steven Obaditch	closed
Recommendation 8: Project Exit Plans (for use 3 months prior to closure) are developed to identify what steps are required to consolidate approaches and systems with key stakeholders; access to sources of funding; and hand over processes, together with roles / responsibilities. Such plans are important for Sustainability as they attempt to embed systems developed and approaches with partners and assist in hand-over. Project management should complete an Exit Plan by 30 April 2019.	The Inmarsat team agree with this recommendation and will work with Hatfield to plan out these activities	Workshop to be held – Oct/Nov	By 30th April 2019	Steven Obaditch / Lida Pet-Soede	Closed

Recommendation	Management Response	Key Actions	Timeframe	person responsible	Status
Recommendation 9: SISFO, given its experience in this IPP in providing training and coaching on a 1 to 1 basis, which may be deemed costly in terms of coverage and time, investigates alternative Training of Trainer scheme for roll out/upscaling purposes that uses Vessel Coordinators or key fish export company staff as trainers in a cost-effective manner.	Awaiting response	Awaiting response	To project end	SISFO	SISFO continue to assist beneficiaries in all sites. However, compared to initial period, awareness raising and training considered limited. No TOT program developed
Recommendation 10: KKP and Project partners (particularly Hatfield) continue to collaborate closely from now to the EOP, to review the regulatory framework for <30GT vessels using the Background Paper produced on best practice solutions most suited to Indonesian Fisheries and find the most pragmatic solution to VMS application for this vessel class. Lack of regulatory reform was identified as a threat / risk to the project's sustainability and impact. Project Management is encouraged to explore all possible avenues to support KKP in its efforts to approve legislation / decrees to give PSDKP mandate to monitor <30 GT vessels and that carrying VMS is compulsory for these boats whilst at sea	The Inmarsat team agree and will continue to work with the KKP team to provide support and information in their regulation decision making. However, the team takes issue that "Lack of regulatory reform was identified as the biggest threat / risk to the project's sustainability and impact" given that Sisfo recently won a contract for 500 devices based upon Safety and Efficiency reasons laid out in this report.	A meeting between KKP Sec Gen Nilanto and Steven Obaditch and Bala Balamurali highlighted the KKP priorities as: 1. Low cost satellite VMS 2. Catch reporting Inmarsat is reviewing several avenues including lower cost local manufactured terminals to bring the price point lower. For above 30 GT vessels Inmarsat is working on Fleet One VMS pricing	EOP		closed

Recommendation	Management Response	Key Actions	Timeframe	person responsible	Status
Recommendation 11: PSDKP should be encouraged to invest in new processes and Standard Operating Procedures (SOPs) for analysing and surveillance asset tasking for the control of fishing vessels < 30 GT. This effort should be focused at both UPT and SATWAS levels.	The Inmarsat team agree and will continue to work with the KKP team to ensure that this gap is closed.	1) KKP assign Business Analyst type resources to understand the operating model for running a <30GT monitoring regime with the *Phinisi* tool 2) KKP identify triggers to implement the plan 3) KKP develop a funding and implementation plan.	3 months	Hatfield	No SOPs approved for this purpose.
Recommendation 12: Development of formal linkages with BASARNAS and other relevant agencies (e.g. Marine Police and the Indonesian Navy) for SAR, including formalised Standard Operating Procedures (SOPs).	The Inmarsat IPP leadership team agree and will continue to work with the KKP team to ensure that this gap is closed	KKP agree to share data to BASARNAS SISFO and coordinator to be notified to send email to BASARNAS in case of emergency	6 months	Hatfield	Closed

Appendix F: Endline M&E Workshop - Team Presentation

DESIGN AND IMPLEMENTATION OF INNOVATIVE SOLUTIONS FOR SMART SATELLITE TECHNOLOGY TO PROMOTE INCLUSIVE AND SUSTAINABLE FISHING PRACTICES IN INDONESIA

Monitoring & Evaluation Workshop
Endline: <30 GT Pilot
Baseline: >30 GT Pilot

Thursday, 01 August 2019 in Bogor

POSEIDON
AQUATIC RESOURCE MANAGEMENT

Monitoring and Evaluation Findings

Bogor Workshop (Thurs, 1st August 2019) – Morning Agenda (<30 GT Endline)

Time	Description
8.30 – 8.45	**Registration**
8.45 – 9.00	**Welcome and opening** • Welcome from KKP • Welcome from the M&E Team
9.00 – 10.00	**Presentation and discussion of the M&E findings (Session 1)** • Outcome 1: Improved safety at sea • Outcome 2: Improved livelihoods
10.00 – 10.15	**Break**
10.15 – 11.15	**Presentation and discussion of the M&E findings (Session 2)** • Outcome 3: Reduced illegal fishing (IUU) • Outcome 4: Improved Monitoring Control and Surveillance (MCS) • Outcome 5: Affordable VMS/Communication model relevant to <30 GT vessels that is integrated and adopted into the Indonesian MCS system.
11.15 – 12.30	**Discussion of findings, recommendations and next steps**
12.30 – 13.30	**Lunch**

Monitoring and Evaluation Findings

Bogor Workshop (Thurs, 1st August 2019) – Afternoon Agenda (>30 GT Baseline)

Time	Description
13.30 – 13.45	**M&E Framework** • Theory of Change • Logical Framework Analysis
13.45 – 14.45	**Discussion of Potential Indicators** • Outputs, Outcomes & Impacts
14.45 – 16.15	**Updates on other work packages** • Patrol boat trial • Phinisi app development • Low cost terminal manufacturing • Policy paper for VMS for <30 GT vessels • Direct data feed
16.15 – 16.30	**Wrap-up and closure of Workshop**
16.30 - 17.00	**>30 GT Fleet One terminal certification**

Contents

Introduction

- Introductions
- Purpose of the Endline Evaluation
- Project Objectives & ToC

Introduction

Purpose of the Endline Evaluation

- Project started in early 2017, so has been going for nearly 2½ years. The equipment was installed from Sept 2017 onwards, so has been operating for nearly two years.

- Following the MTE in August 2018, the project closed end June 2019, so it is now time to assess the progress towards the targets at this end point.

- The endline evaluation will assesses the degree to which the project is on track to achieve its outcomes and impacts.

- A further ‘legacy’ evaluation will be conducted in 2020 to examine how the situation has changed after financial support has been withdrawn.

Introduction

Project Objectives and ToC

Overall goals are twofold:

1. **The safety, productivity and food security of Indonesian fishers and their communities enhanced through the expansion and adoption of VMS.**

- Outcome 1: Safety and security of mid-sized vessels (20-30GT) and larger (30 GT+) fishing vessels improved using satellite-based communication and VMS technology
- Outcome 2: Welfare and livelihoods of fishers and their dependents improved using satellite-based communication and VMS technology

2. **The effectiveness of monitoring & enforcement efforts by the authorities improved through technology and process improvements.**

- Outcome 3: Levels of IUU fishing (with client fleet) reduced through targeted monitoring, control and surveillance (MCS) resulting from the use of satellite-based communication and VMS technology
- Outcome 4: Improved capacity to plan and implement monitoring, control and surveillance (MCS) within the national and local government
- Outcome 5: Affordable VMS/Communication model relevant to <30 GT vessels that is integrated and adopted into the Indonesian MCS system

Methodology

- Pilot Fleets
- Fieldwork Schedule
- Fieldwork Methodologies

Methodology

Pilot Fleet Locations

Bali

Lombok

Maumere

Larantuka

Handline fisheries

Pole & line fisheries

Methodology

Pilot Fleets

Handline fishery (Benoa and Lombok)

- The handline fishery uses a simple baited handline to catch tuna and other pelagic fish on Fish Aggregating Devices (FADs, or rumpons).
- Average trip time is 10 – 14 days, operating up to 200 nm from home, using FADs.
- Operate mainly in groups of up to 6 vessels.
- It is highly seasonal, operating from March – November.
- Many of the Lombok-based boats are from Sinjai, and they rest the fleet over January and February.
- Other, mostly Bali-based handliners may continue to fish over the west monsoon

Port	Size class	No.	%
Benoa	11-20 GT	10	22%
22%	21-30 GT	36	78%
	Sub-total	***46***	
Larantuka	6-10 GT	4	7%
26%	11-12 GT	14	20%
	21-30 GT	36	80%
	Sub-total	***54***	
Lombok	<5 GT	21	22%
46%	6-10 GT	42	45%
	11-20 GT	14	15%
	21-30 GT	17	18%
	Sub-total	***94***	
Maumere	21-30 GT	11	100%
5%	***Sub-total***	***11***	
TOTAL		**205**	

Port	Size class	Gear type	
		P&L	HL
Benoa	11-20 GT	0%	7%
	21-30 GT	0%	26%
	Sub-total	***0%***	***33%***
Larantuka	6-10 GT	6%	0%
	11-20 GT	22%	0%
	21-30 GT	55%	0%
	Sub-total	***83%***	***0%***
Lombok	<5 GT	0%	15%
	6-10 GT	0%	30%
	11-20 GT	0%	10%
	21-30 GT	0%	12%
	Sub-total	***0%***	***67%***
Maumere	21-30 GT	17%	0%
	Sub-total	***17%***	
TOTAL		**100%**	**100%**

Source: Vessel registration database, June 2018

Methodology Discussions

Pilot Fleets

Pole and line fishery (Larantuka & Maumere)

- The pole and line fishery uses fishing poles to hook fish that have been baited into a feeding frenzy.
- Average trip times are 2-3 days, <60 nm from land (FAD & free school)
- This is primarily a skipjack-targeted fishery

Gear / Species	Year				
	2012	2013	2014	2015	2016
Pole & line (baitboat)					
Frigate tuna	57	64	54	53	53
Kawakawa	1	1	1	1	1
Longtail tuna	78	87	74	72	72
Skipjack tuna	3,140	3,527	2,998	2,919	2,919
Yellowfin tuna	464	522	443	432	432
Baitboat total	***3,739***	***4,200***	***3,571***	***3,476***	***3,476***
Hand line					
Kawakawa	6,135	5,657	4,814	4,689	4,750
Longtail tuna	3,254	3,531	2,727	3,036	2,926
Spanish mackerel	959	997	1,234	1,048	982
Skipjack tuna	5,506	4,259	3,627	3,564	3,744
Yellowfin tuna	5,986	6,626	5,518	5,363	5,371
Hand line total	***21,841***	***21,070***	***17,920***	***17,701***	***17,773***

Port	Size class	No.	%
Benoa	11-20 GT	10	22%
22%	21-30 GT	36	78%
	Sub-total	***46***	
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	21-30 GT	17	18%
	Sub-total	***94***	
Maumere	21-30 GT	11	100%
5%	***Sub-total***	***11***	
TOTAL		**205**	

Port	Size class	Gear type	
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Benoa	11-20 GT	0%	7%
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	Sub-total	***83%***	***0%***
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	6-10 GT	0%	30%
	11-20 GT	0%	10%
	21-30 GT	0%	12%
	Sub-total	***0%***	***67%***
Maumere	21-30 GT	17%	0%
	Sub-total	***17%***	
TOTAL		**100%**	**100%**

Source: Vessel registration database, June 2018

Methodology

Fieldwork Schedule

BALI	
Mon, 22 July 2019	Methodology review with KKP Meeting with Benoa Bali UPT
Tues, 23 July 2019	Meeting with SISFO Meetings with vessel coordinators (Bapak Nyoman & Bapak Agung) Meetings with vessel captains (<30 GT) in Tanjung Benoa
Weds, 24 July 2019	Small FGD with captain and crew in Benoa
Thurs, 25 July 2019	PT Primo Indo Ikan

LOMBOK TIMUR	
Fri, 26 July 2018	Meeting with PSDKP SATWAS in Labbuhan Lombok Meeting with fish processor and coordinator Meeting with Syahbandar / Port Authorities Meeting with vessel captains

Methodology

Fieldwork Schedule

LARANTUKA	
Weds, 24 July 2019	Meeting with Primo Vessel Coordinator (Bapak Hillmar)
Thurs, 25 July 2019	Meetings with Okisin Vessel Coordinator (Bapak Sumitro); Government agencies (PSKPD, Basarnas, navy, DKP); Vessel owner / captain Flotim 24
Fri, 26 July	Meetings with owners of pilot boats Flotim 7, 9 and 4; crew of Flotim 24; Control boat owner NB 53; and wife of Flotim 4 owner
JAKARTA / BOGOR	
Mon, 29 July 2019	Report writing and prepare for workshop
Tues, 30 July 2019	Meeting with Hatfield Meeting with KKP Meeting with Marine Change
Weds, 31 July 2019	Report writing and prepare for workshop
Thurs, 01 Aug 2019	Workshop (in Bogor)
Fri, 02 Aug 2019	Report writing

Methodology

Data collection methods

– **Focused Group Discussions** (FGDs): Used with the VRB survey to provide further qualitative investigation related to safety at sea, livelihoods and fishing decision-making, illegal fishing and MCS aspects.

– **Fishing Vessel Cost-Earnings Assessment Survey**: to identify (on selected pilot & control vessels) how the use of SMS information leads to more efficient fishing resulting in reduced costs (fuel); income per days fished; and fish catch share amongst crew members etc (see separate discussion).

- **SMS Content Analysis:** analysis of each SMS message sent to and from the pilot vessels to categorise the function of the communication system e.g. for emergency communication, managing fishing operations or simply social chatter.

- **Process Evaluation**: analysis of the effectiveness, relevance and efficiency of project delivery (see separate discussion)

Yellowfin tuna

Skipjack tuna

Initial Findings of the Endline Assessment for <30 GT Vessels

Impact Evaluation

Introduction

Evaluation is based in the 5 *Outcome Indicators* in the *Logical Framework Analysis*:

Impact 1: The safety, productivity and food security of Indonesian fishers and their communities enhanced through the expansion and adoption of VMS

- Outcome 1: Safety and security of mid-sized fishing vessels (<30GT) improved using satellite-based communication and VMS technology
- Outcome 2: Welfare and livelihoods of fishers and their dependents improved using satellite-based communication and VMS technology

Impact 2: The effectiveness of monitoring & enforcement efforts by the authorities improved through technology & process improvements.

- Outcome 3: Levels of IUU fishing reduced through targeted MCS resulting from the use of satellite-based communication and VMS technology
- Outcome 4: Improved capacity to plan and implement MCS within the national and local government
- Outcome 5: Affordable VMS/Communication model relevant to <30 GT vessels that is integrated and adopted into the Indonesian MCS system

Impact Evaluation

Introduction

For each outcome we examine:

Relevance: The extent to which the objectives of a development intervention are consistent with beneficiaries' requirements, country needs, global priorities and partner' and donor's policies**.**

Impact: The positive and negative, primary and secondary long-term effects produced by a development intervention, directly or indirectly, intended or unintended.

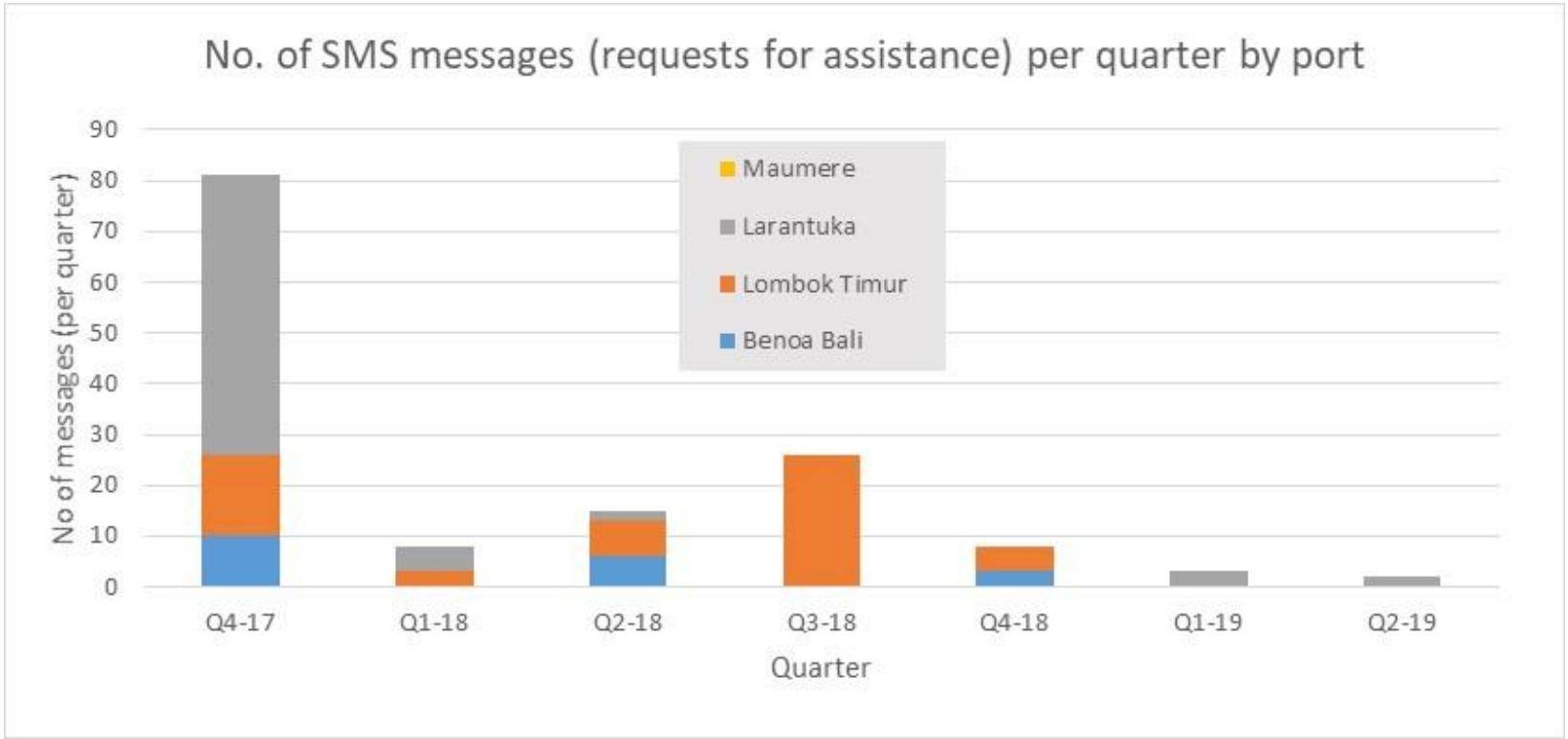
Effectiveness: The extent to which the development intervention's objectives were achieved, or are expected to be achieved, taking into account their relative importance

Sustainability: the continuation of benefits from a development intervention after major development assistance has been completed. The probability of continued long-term benefits. The resilience to risk of the net benefit flows over time

Impact Evaluation

Outcome 1: Safety and security of mid-sized fishing vessels (<30GT) improved using satellite-based communication and VMS technology

OC1-1. No. of SMS message declarations for assistance transmitted (out) by pilot vessels over quarter by port (<30 GT)

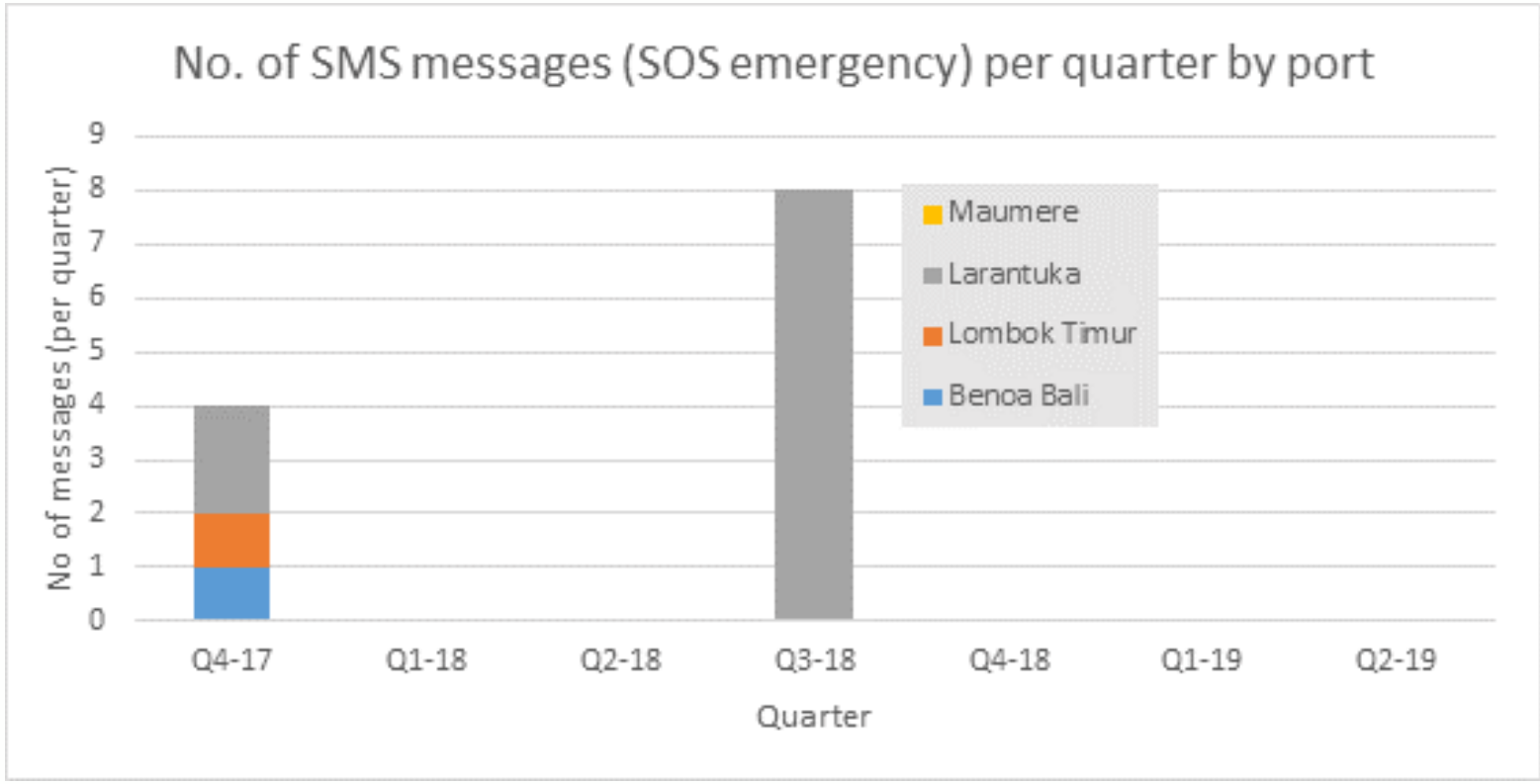


- Assistance requirements dominated by Lombok Timur vessels
- Decline over project period, although uptick over last quarter
- There does not seem to be any linkage to weather conditions (at worst over Q1 and Q3)

Impact Evaluation

Outcome 1: Safety and security of mid-sized fishing vessels (<30GT) improved using satellite-based communication and VMS technology

OC1-2. No. of emergency SOS signals (panic button or message) transmitted by pilot vessels over quarter (<30 GT)

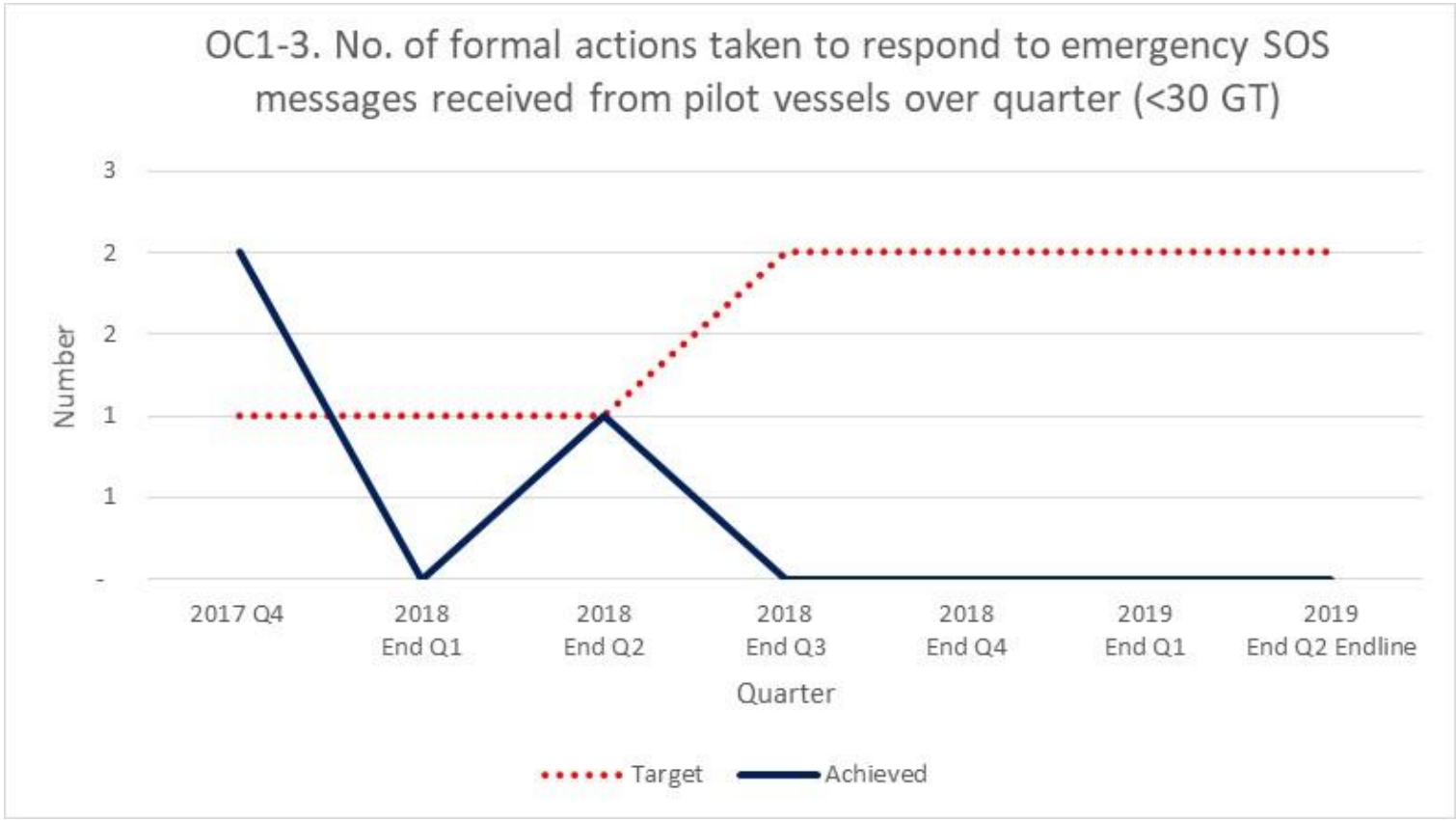


- No patterns are likely to be detected from this indicator, although they may be associated with either poor weather (e.g. higher risk) or high levels of fishing activity (e.g. higher likelihood)
- Mostly associated with Larantuka vessels

Impact Evaluation

Outcome 1: Safety and security of mid-sized fishing vessels (<30GT) improved using satellite-based communication and VMS technology

OC1-3. No. of formal actions taken to respond to emergency SOS messages received from pilot vessels over quarter (<30 GT)

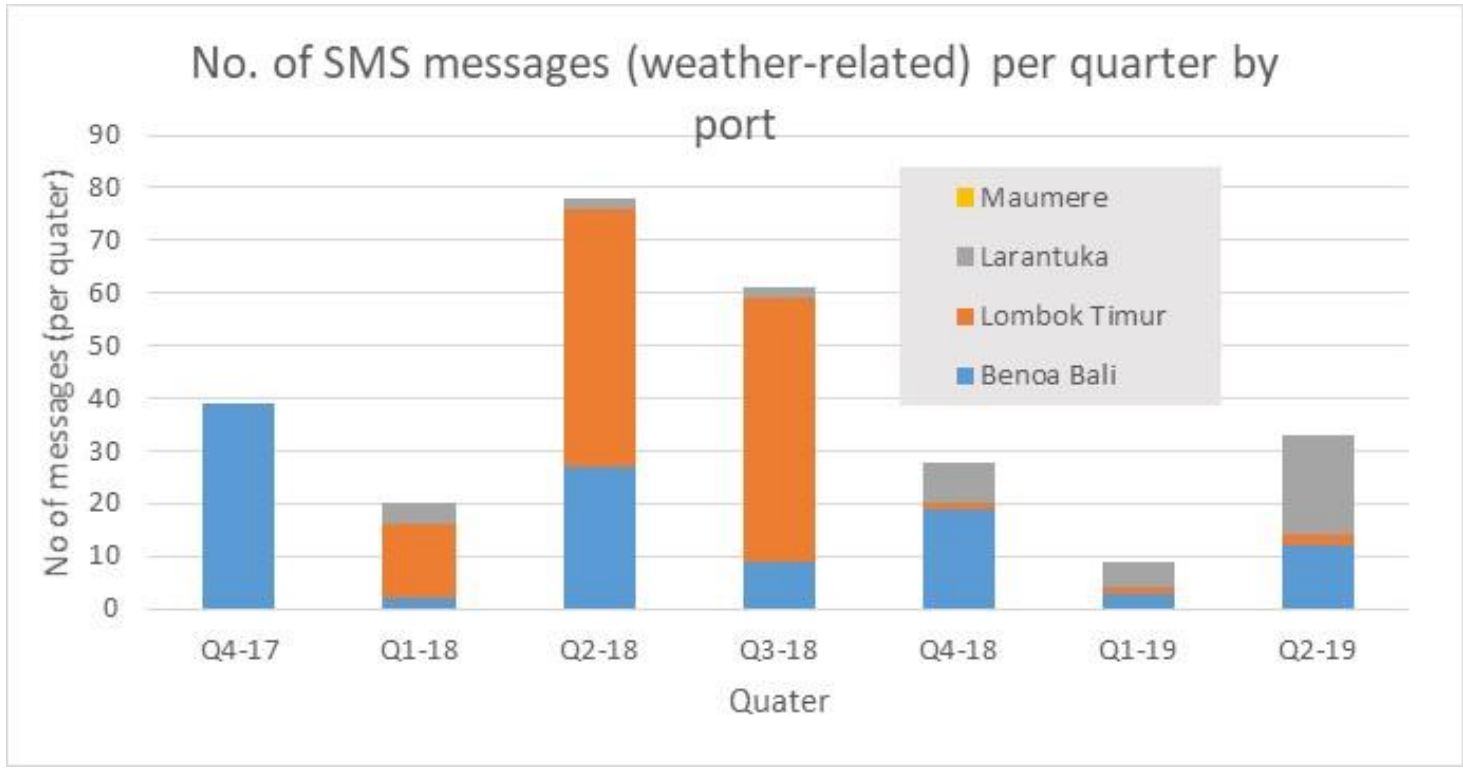


- The target was set with an assumption that two vessels per quarter would need assistance and a formal response (e.g. from BASARNAS) would result.
- In actuality, most vessels asked for assistance from the vessel coordinator, owner or other fishing vessels (esp. if they work in a group) and, so no formal response is needed.

Impact Evaluation

Outcome 1: Safety and security of mid-sized fishing vessels (<30GT) improved using satellite-based communication and VMS technology

OC1-4. No. of decisions (e.g. stop fishing, heave to, seek shelter, etc.) made to safeguard vessel and crew resulting from weather information received over quarter (<30 GT 400)



- FGDs indicate that SMS messaging over weather conditions (usually via the coordinator) is very useful
- The number of weather-related messages has steadily increased over the pilot project
- The new group chat feature will be very useful to extend this feature

Impact Evaluation

Outcome 1: Safety and security of mid-sized fishing vessels (<30GT) improved using satellite-based communication and VMS technology

Relevance	• Improving vessel safety and security is still a highly relevant outcome area • Satellite-based communications are essential for the majority of each trip
Effectiveness	• The equipment has proved to be highly effective in communicating critical and non-critical emergencies • Emergency messages were almost always via SMS to the vessel coordinator or other group fishing vessels • Vessels can now be pre-warned of incoming weather events such as storms or poor sea conditions • The fact that 70% of SMS communication is mainly social exchange suggests that the system is improving fisher and family well-being

Impact Evaluation

Outcome 1: Safety and security of mid-sized fishing vessels (<30GT) improved using satellite-based communication and VMS technology

Emerging Impact

- The equipment has proved to be highly effective in resolving critical emergencies. To date 4 emergencies (43 crew) have been resolved as follows:
  - *Rizky Jaya 03*: crew, vessel and cargo were saved.
  - *Flores Tuna 09*: Crew rescued but vessel sank shortly afterwards.
  - *Aisah 42*: sick crew member hospitalized after medical advice.
  - *Flotim 09*: crew, vessel and cargo were saved
- Both crew and their land-based family feel safer as a result of having secure, long-range communications and vessel tracking
- There is no apparent impact on crew retention

Impact Evaluation

Outcome 1: Safety and security of mid-sized fishing vessels (<30GT) improved using satellite-based communication and VMS technology

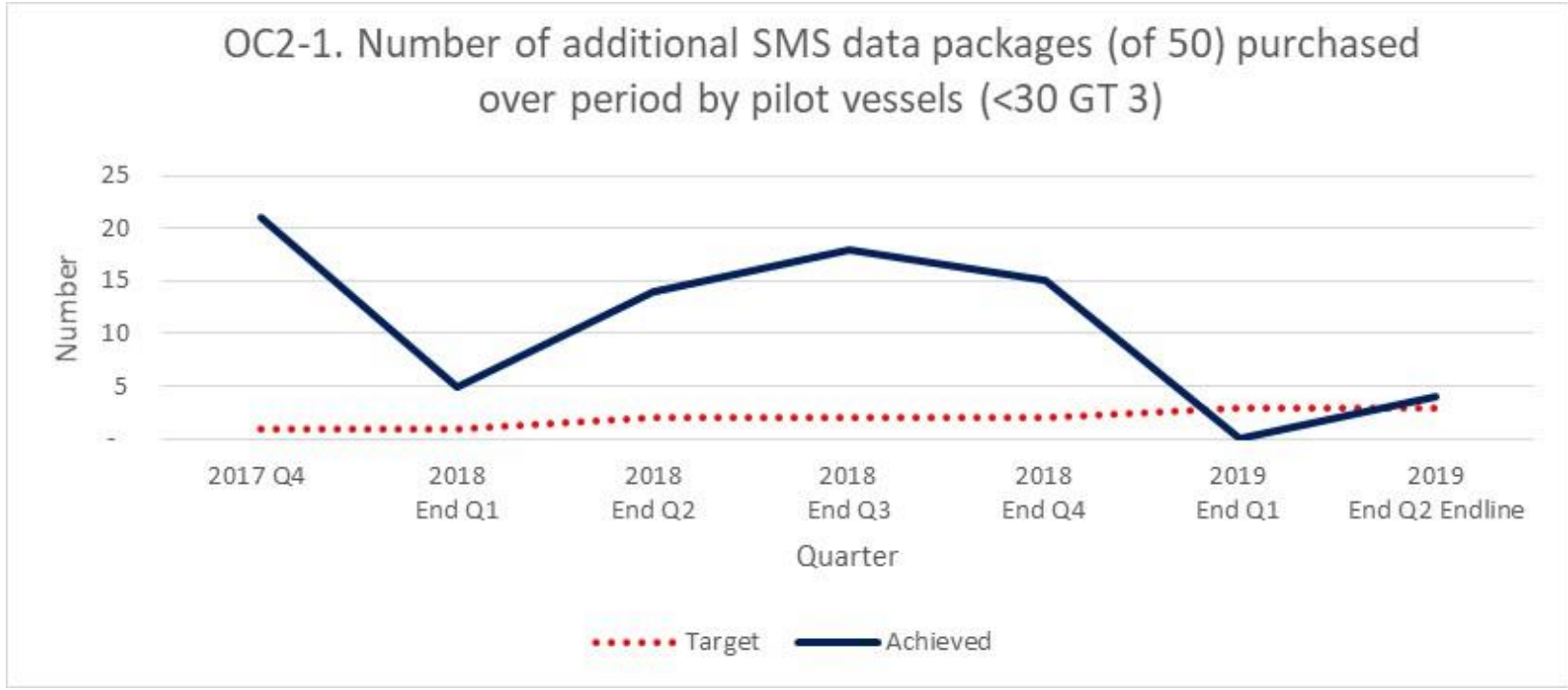
Sustainability

- The ability to declare and communicate over emergencies was ranked first by the vessel coordinators and also by many captains and crew
- Anecdotal evidence suggests that the introduction of SMS communication will drastically reduce the cost of emergency responses
- Safety at Sea was ranked first by most vessel Coordinators, owners and captains interviewed as the most important benefit of Pointrek SMS communication app.

Impact Evaluation

Outcome 2: Welfare and livelihoods of fishers and their dependents improved using satellite-based communication and VMS technology

OC2-1. Number of additional SMS data packages (of 50) purchased over period by pilot vessels (<30 GT)

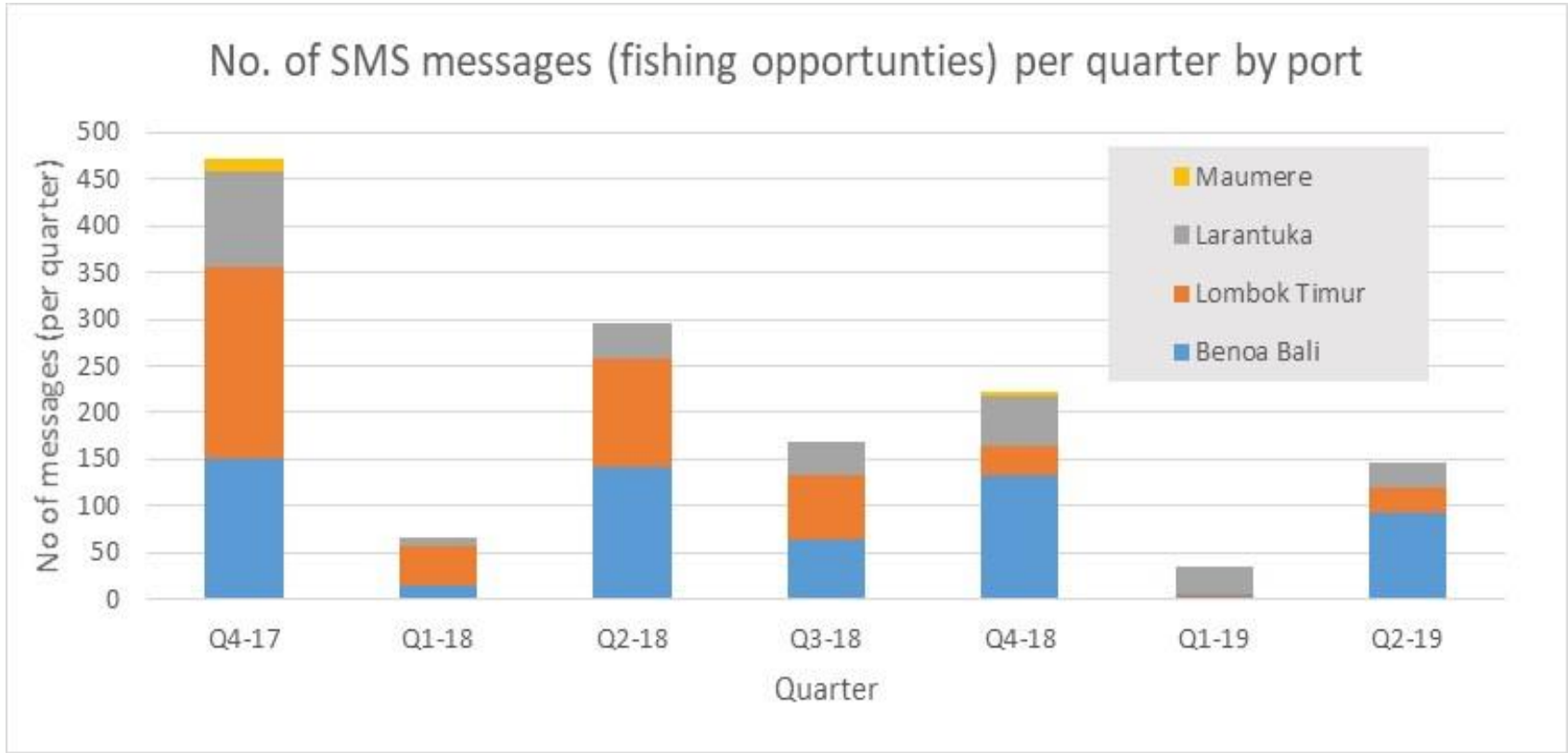


- The target was set to increase conservatively over the project from one to three extra SMS packages per quarter
- After an initial and mid-project high (c. 20 / quarter), purchasing has dropped to zero in the Q1-19 during the low season.
- This is possibly due to a more considered use of SMS quota, although the proportion of social messages remained the same.

Impact Evaluation

Outcome 2: Welfare and livelihoods of fishers and their dependents improved using satellite-based communication and VMS technology

OC2-2. No. of SMS messages transmitted / received by fishing boats relating to fishing opportunities (<30 GT)

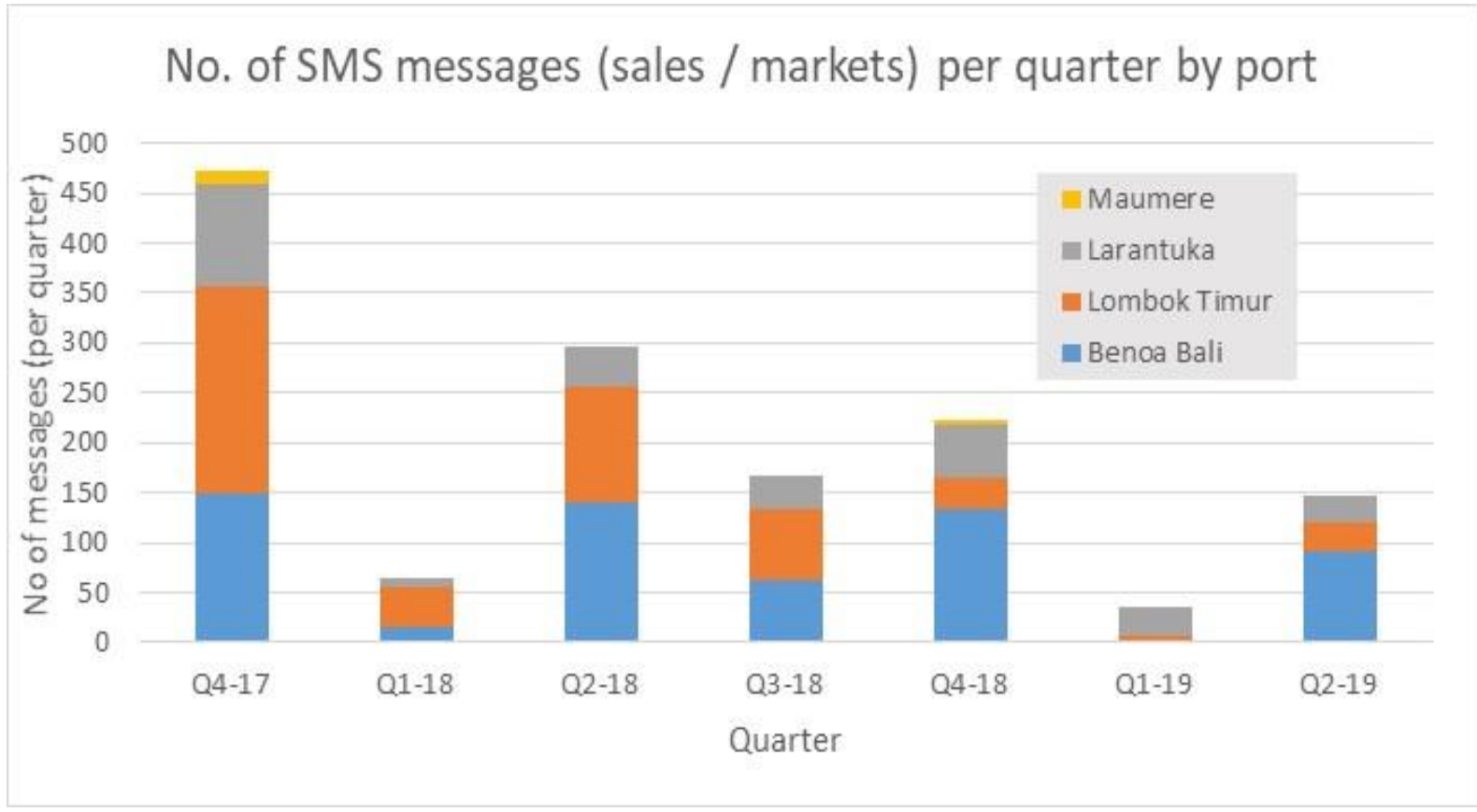


- The Theory of Change assumes that this is a key indicator of behaviour change….over 11% of all SMS is dedicated to fishing opportunities
- Mainly used by the HL fisheries of Lombok & Bali (which mainly work in groups)
- Also some from the P&L vessels in Larantuka, esp. over Q4-18 (see next bullet)
- Mainly associated with the low season, when fish are hard to find

Impact Evaluation

Outcome 2: Welfare and livelihoods of fishers and their dependents improved using satellite-based communication and VMS technology

OC2-3. No. of SMS messages transmitted / received by fishing boats relating to sales / market opportunities (<30 GT 20)

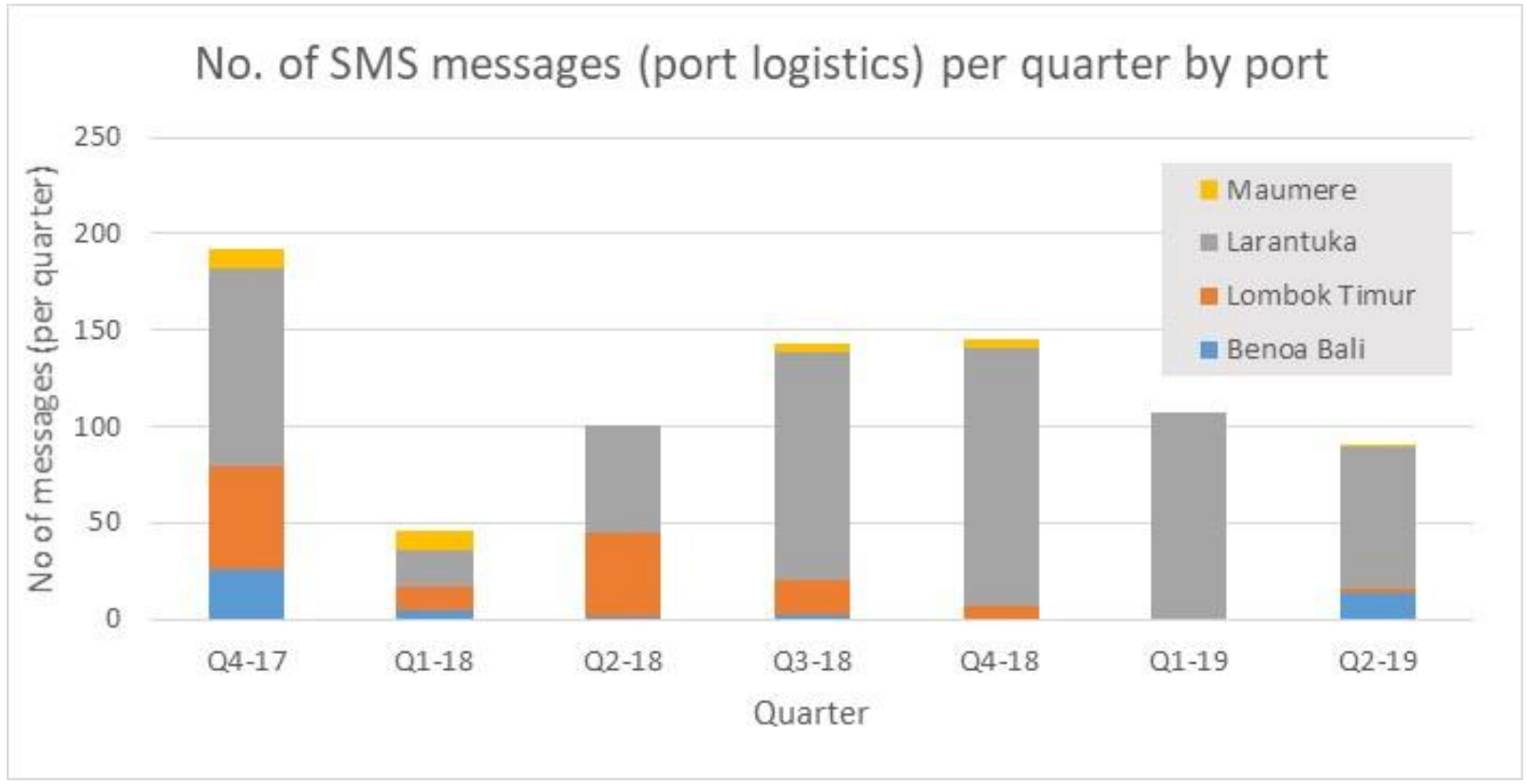


- Around 7% of SMS messages relate to the sale or marketing of the catch
- This is mainly skewed towards the handline vessels in Bali and Lombok, but also featured in Q4-18 for Larantuka (again peak season)
- Q1 hand line boats laid up in Sinjai

Impact Evaluation

Outcome 2: Welfare and livelihoods of fishers and their dependents improved using satellite-based communication and VMS technology

OC2-4. No. of SMS messages transmitted / received by fishing boats relating to logistics (ice, bait, victuals) (<30 GT)



- Use of logistics-related SMS has also increased over the project period
- It is particularly associated with the P&L vessels in Larantuka & Maumere, especially over the latter part of the project.
- This suggests that it has been useful in ensuring a quick turn-around of these short-trip vessels

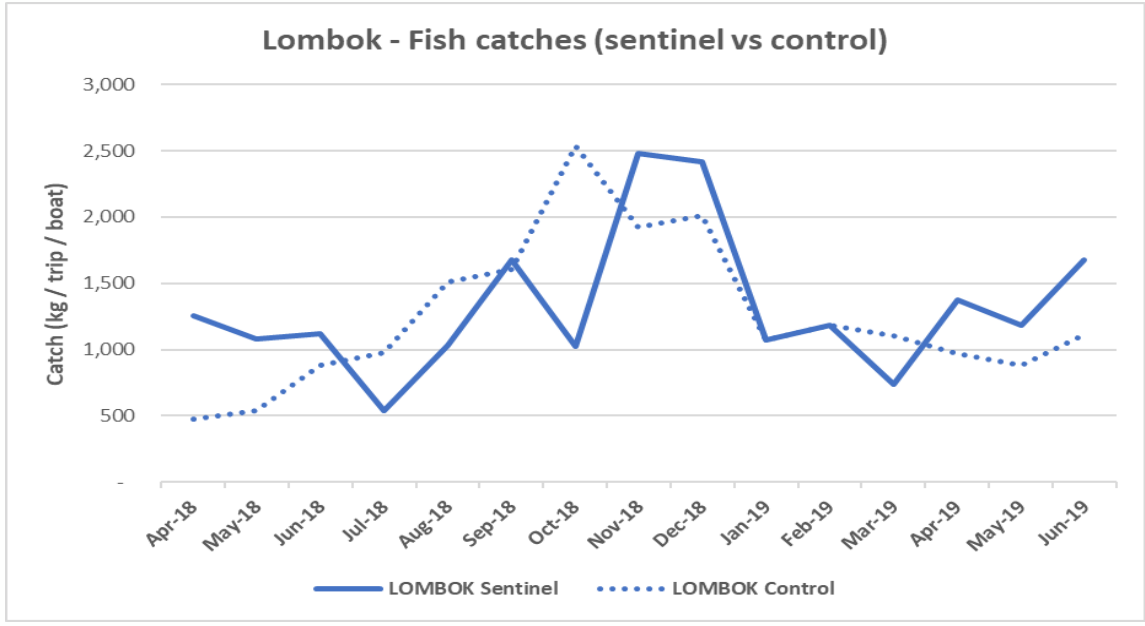
Impact Evaluation

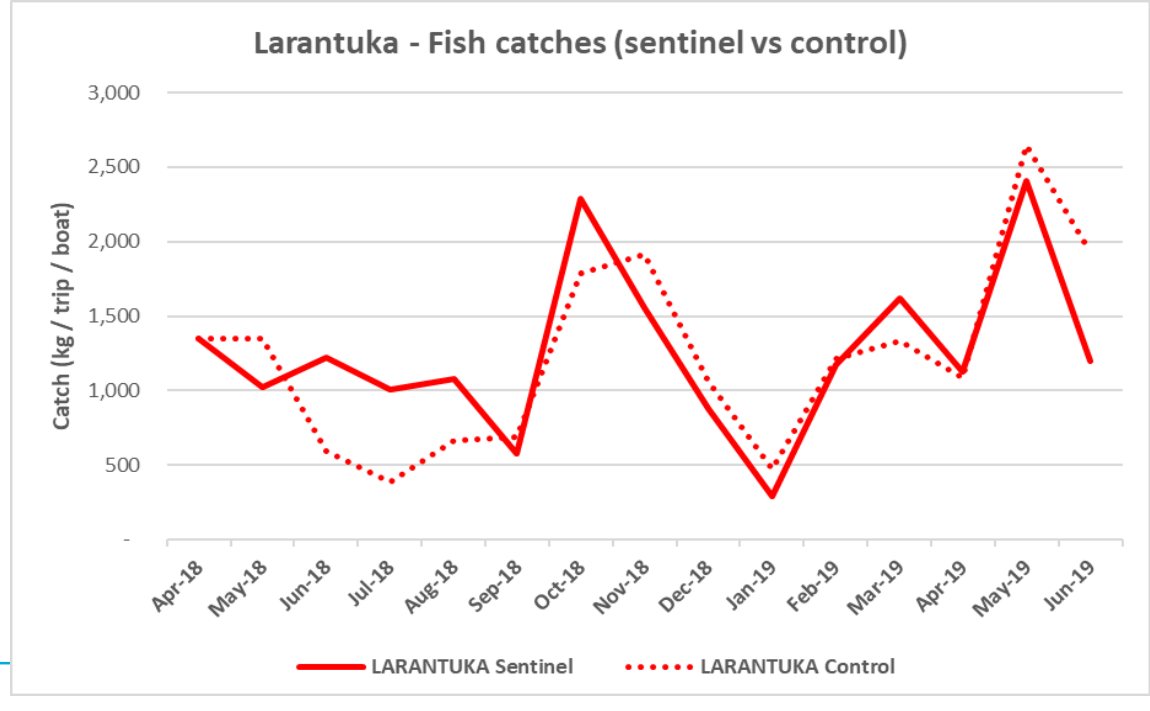
Outcome 2: Welfare and livelihoods of fishers and their dependents improved using satellite-based communication and VMS technology

OC2-5. Sentinel pilot vessels have a higher catch volume per fishing trip against controls in Lombok & Larantuka (Kgs/trip)

Site	Treatment	Average catch kgs/trip	Percent
LOMBOK	Sentinel	1,324	
LOMBOK	Control	1,252	5.76%
LARANTUKA	Sentinel	1,252	
LARANTUKA	Control	1,233	1.59%

- Fish catch higher for Sentinel fleet (6% in Lombok; 1.6% in Larantuka
- High variation between treatments /seasons
- High season Sept- Dec; low season Jan to March (weather/turbidity)



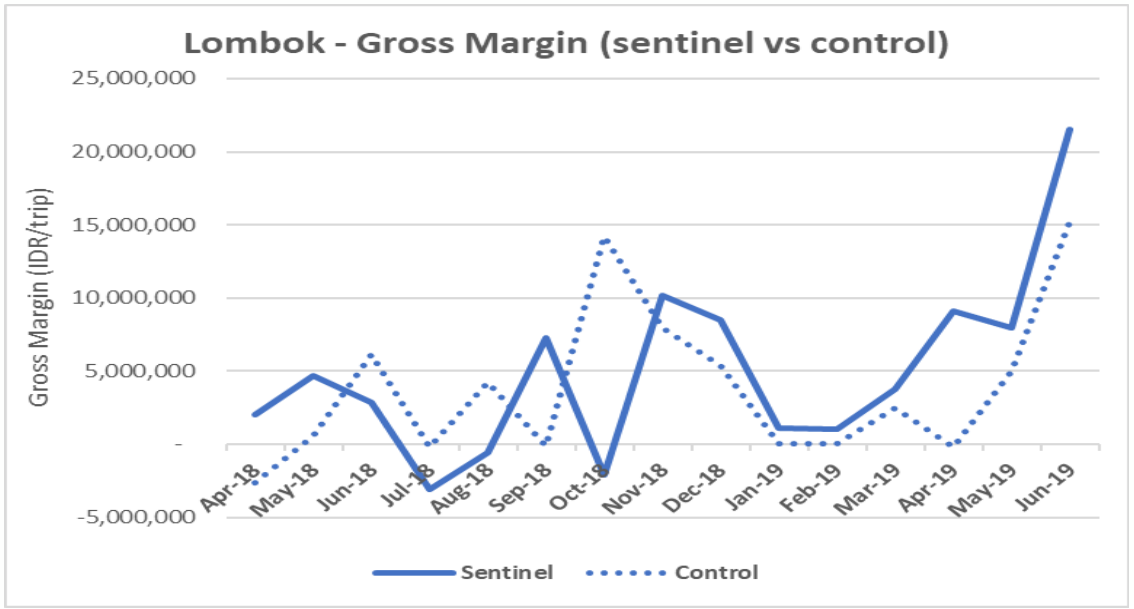


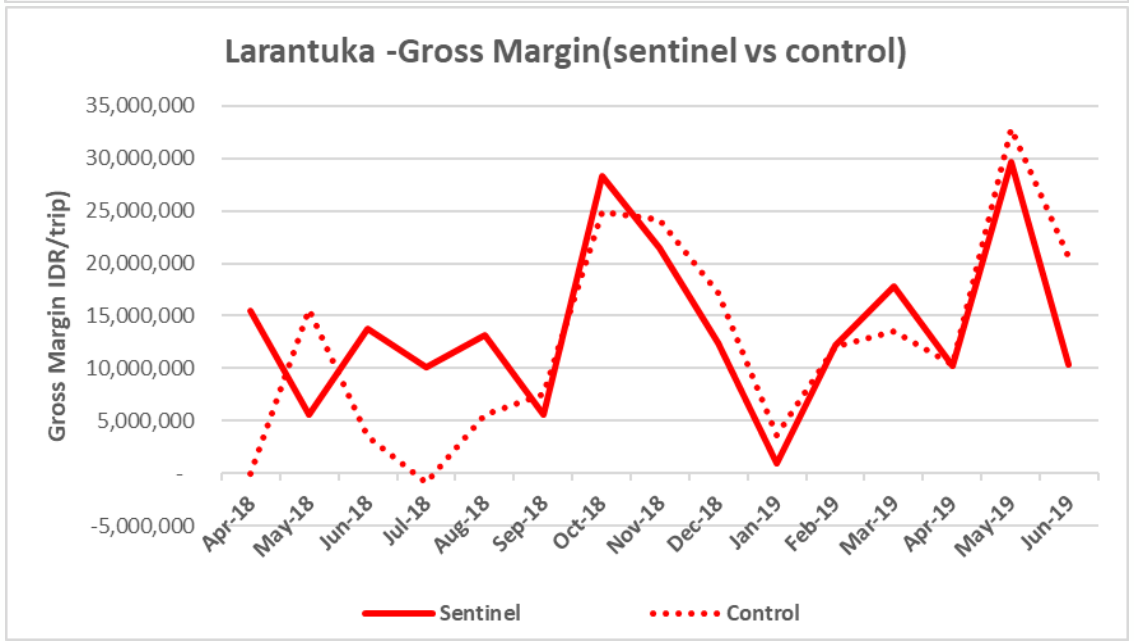
Impact Evaluation

Outcome 2: Welfare and livelihoods of fishers and their dependents improved using satellite-based communication and VMS technology

OC2-6. Sentinel pilot vessels have a higher gross margin per fishing trip against controls in Lombok & Larantuka (incremental gross margin per trip)

Site	Treatment	Average GM/trip-IDR	Percent
LOMBOK	Sentinel	4,980,122	
LOMBOK	Control	3,992,480	24.74%
LARANTUKA	Sentinel	13,792,124	
LARANTUKA	Control	13,594,003	1.46%





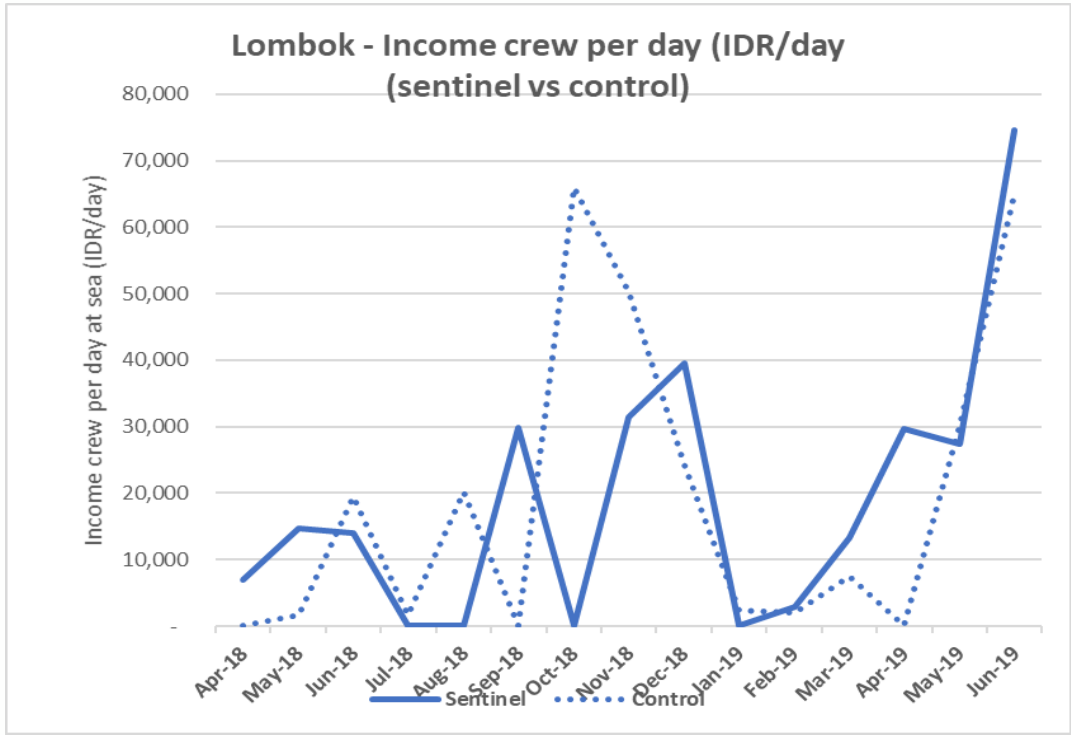
- Gross margin per trip much lower in Lombok than LTUKA
- Lombok sentinel fleet more gross margin per trip than control boats (25%)
- Sentinel fleet in Larantuka 1.5% more gross margin per trip than control boats.
- GM closely linked to catch size in LTUKA
- High GM in June 2019 in Lombok due to high catch of grade A yellow fin tuna

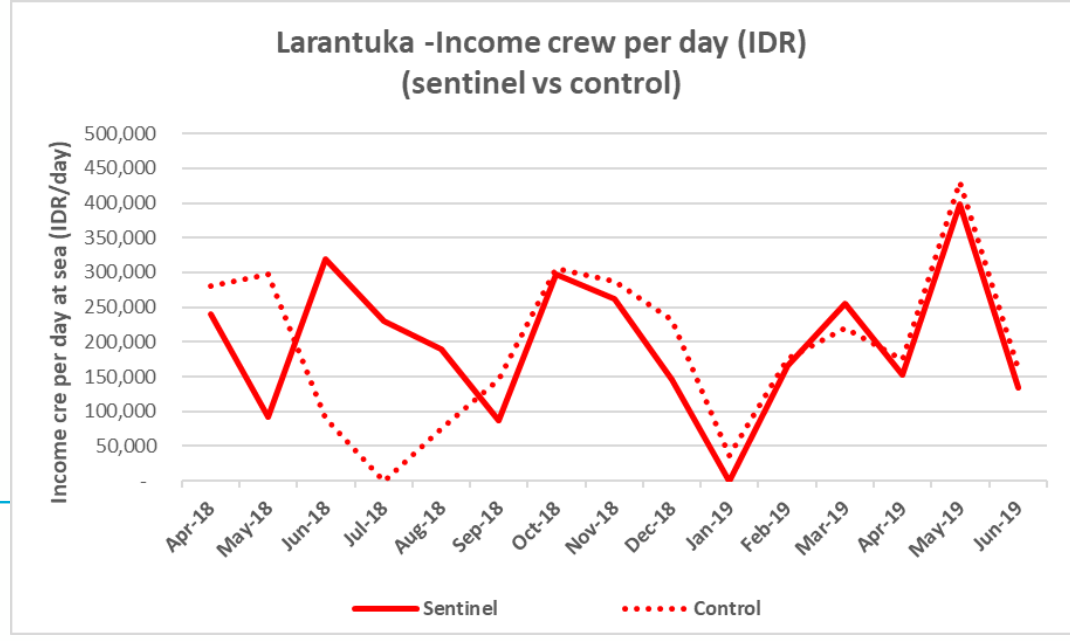
Impact Evaluation

Outcome 2: Welfare and livelihoods of fishers and their dependents improved using satellite-based communication and VMS technology

OC2-7. Sentinel pilot vessels have increased fish catch share income per crew member per day at sea against controls in Lombok & Larantuka

Site	Treatment	Average income day per crew member (IDR/day)	Percent
LOMBOK	Sentinel	20,313	
LOMBOK	Control	19,383	4.80%
LARANTUKA	Sentinel	198,041	
LARANTUKA	Control	194,129	2.02%





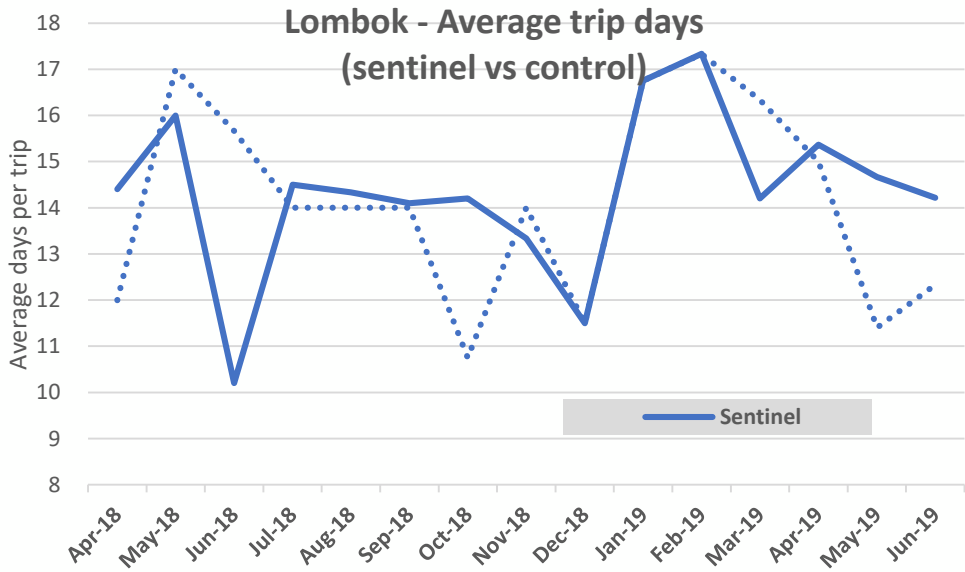
- Although Gross Margin per trip was higher for Lombok Sentinel Fleet, the average income per day was higher than Control fleet (4.8 %) even though more time was spent at sea (see OC-2-8). Income per day is considered very low (GBP 1.0 per day)
- Income per crew per day for Larantuka Sentinel fleet was 2% higher
- Income in Larantuka is significantly higher than Lombok (200,000 IDR per day compared with 20,000 IDR/day)

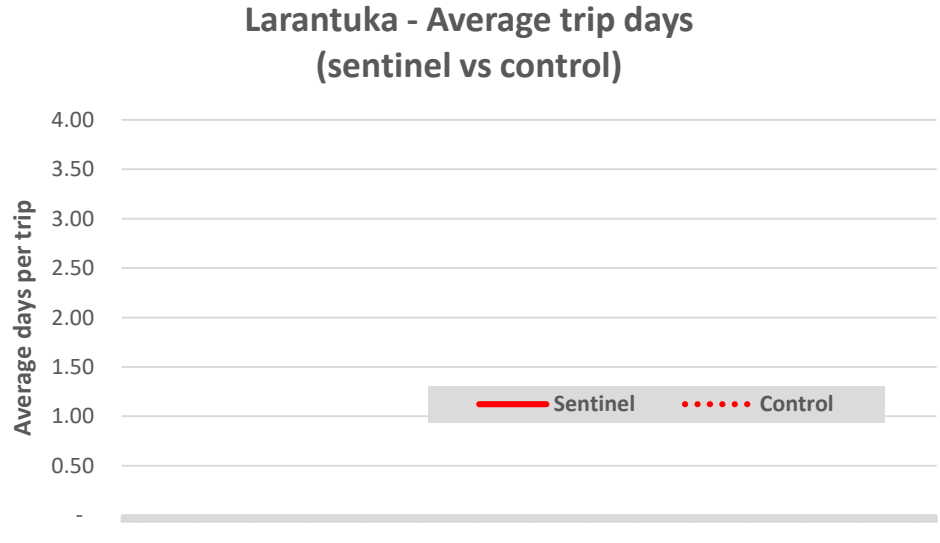
Impact Evaluation

Outcome 2: Welfare and livelihoods of fishers and their dependents improved using satellite-based communication and VMS technology

OC2-8.Sentinel pilot vessels have reduced time at sea against controls in Lombok & Larantuka (days less per trip).

Site	Treatment	Average time at sea	percent
LOMBOK	Sentinel	14.34	
LOMBOK	Control	14.14	-1.43%
LARANTUKA	Sentinel	2.43	
LARANTUKA	Control	2.44	0.18%





- Slightly more time spent at sea by Lombok Sentinel Fleet (extra 0.2 day) compared to control boats
- Similar time at sea for both Larantuka fleets.
- Boats with VMS in Larantuka went further to sea compared to control boats – (100 to 120 nm compared to around 50 nm), but spent less time looking for fish

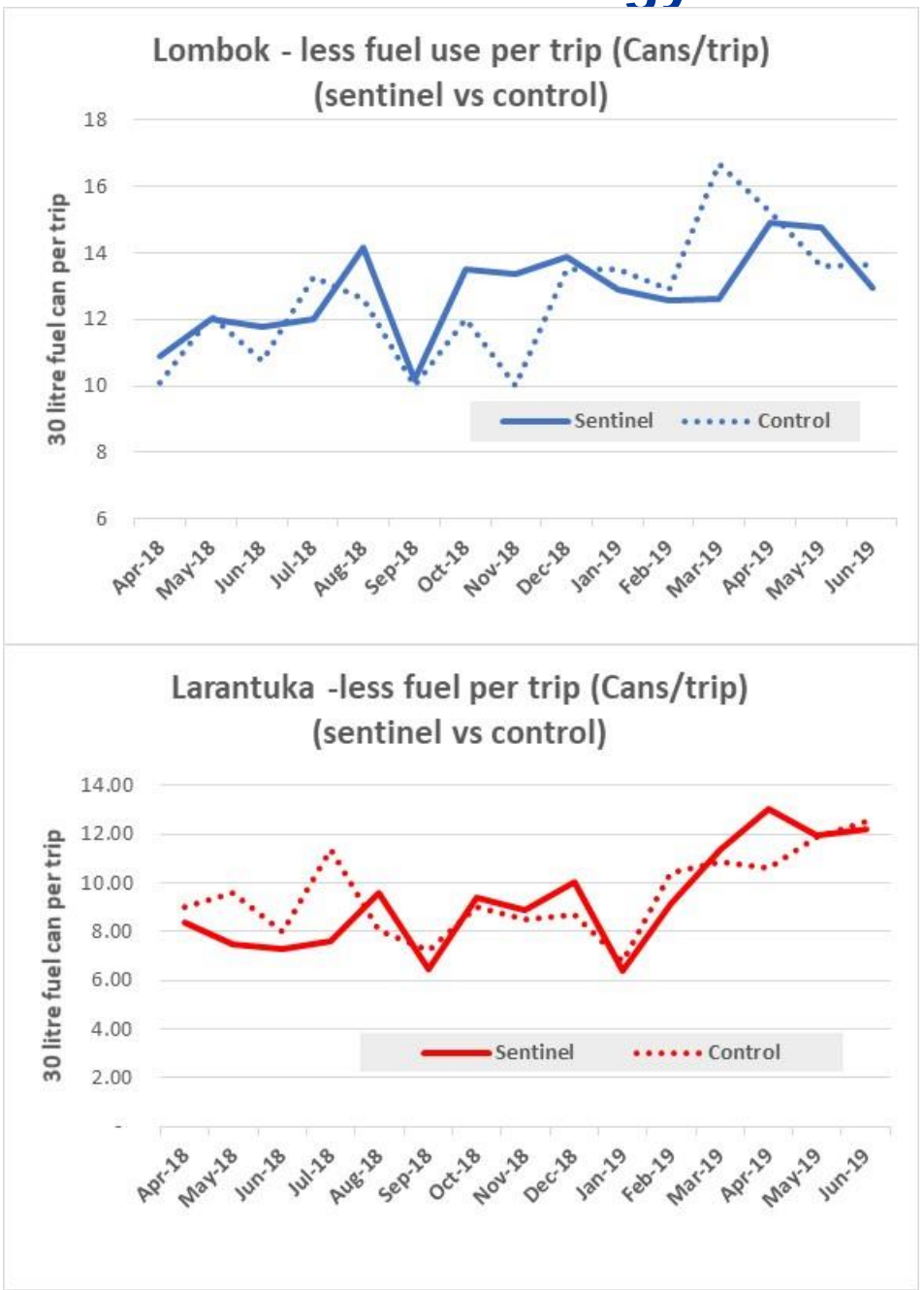
Impact Evaluation

Outcome 2: Welfare and livelihoods of fishers and their dependents improved using satellite-based communication and VMS technology

OC2-9. Sentinel pilot vessels have reduced fuel usage per trip against controls in Lombok & Larantuka (Less cans (30 litre of fuel used per trip):

Site	Treatment	Less fuel per trip (30 Liter can/trip)	percent
LOMBOK	Sentinel	12.84	
LOMBOK	Control	12.66	-1.40%
LARANTUKA	Sentinel	9.29	
LARANTUKA	Control	9.50	2.18%

- Lombok sentinel fleet used slightly more cans of fuel than control boats (1.4% more)
- Larantuka sentinel fleet incurred a slight cost saving (2.18% less fuel) than control boats



Impact Evaluation

Outcome 2: Welfare and livelihoods of fishers and their dependents improved using satellite-based communication and VMS technology

Comparison with boats with high SMS use with Control fleet

Of the 5 Sentinel fleet vessels in LTUKA one boat - FLOTIM 24 - had high use of the SMS feature whereas the other boats had very low or no use of VMS (thus making them similar to control boats with little benefit from the comm. system). As seen below, only a small proportion of pilot vessels used SMS app regularly.

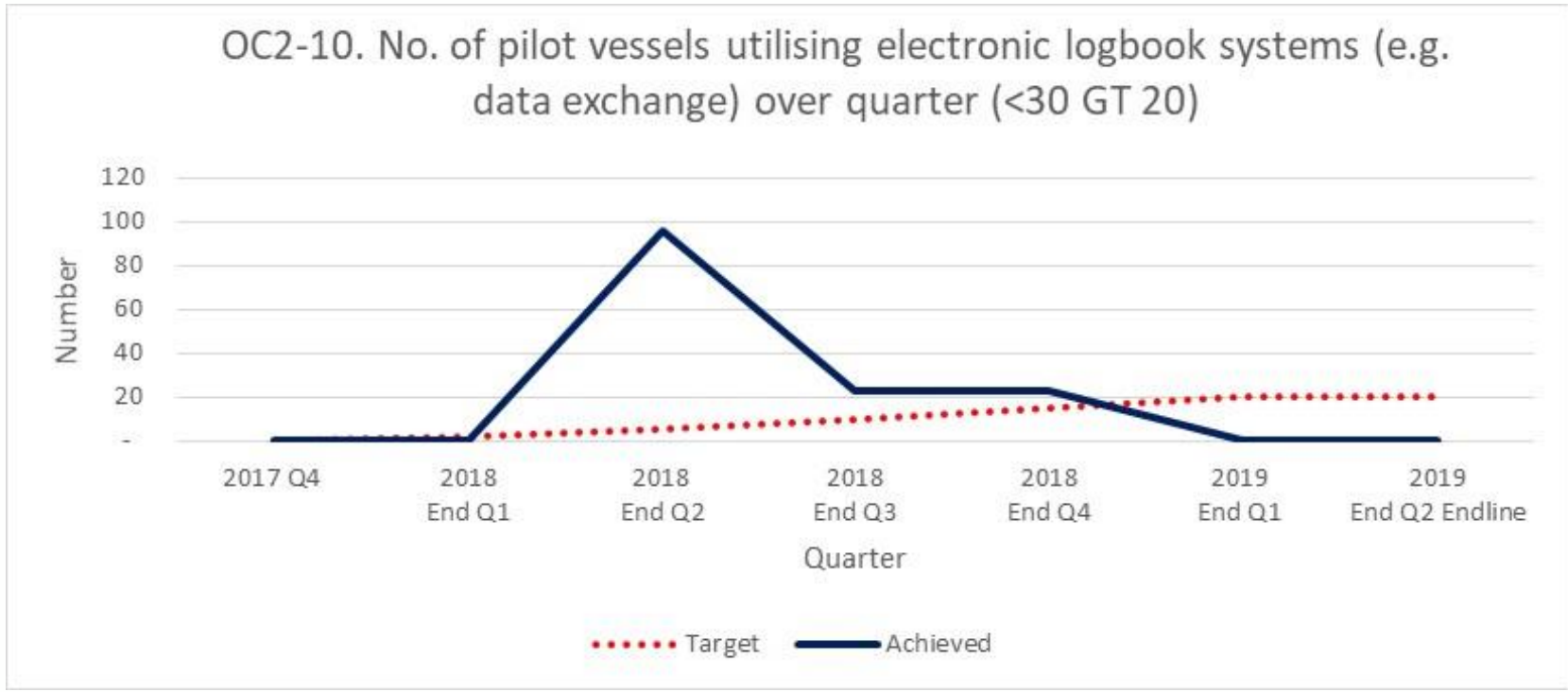
Criteria	Lanatuka - Flotim 24	Larantuka Control fleet	Percent difference
Average catch kgs/trip	1,630	1,233	32%
Average GM/trip-IDR	18,148,413	13,594,003	34%
Average income day per crew member (IDR/day)	264,072	194,129	36%
Average time at sea (days/trip)	2.4	2.44	0%
Less fuel per trip (30 Liter can/trip)	11.3	9.5	-19%

- *Flotim 24* with high SMS use showed large benefits in terms of catch, profitability, income per crew member compared to control fleet vessels (30% +). Same time at sea, but higher fuel use (19%) to reach FADs with fish
- It is not whether you have VMS + SMS app on board or not, but it is whether you use it to your advantage to help find fish and assist with boat logistics and fish marketing
- In Lombok, none of the sentinel fleet boats displayed high SMS use whilst at sea

Impact Evaluation

Outcome 2: Welfare and livelihoods of fishers and their dependents improved using satellite-based communication and VMS technology

OC2-10. No. of pilot vessels utilising electronic logbook systems (e.g. data exchange) over quarter (<30 GT 20)



- The number of vessels submitting catch logbook data has declined over the project period
- An initial spike (Q2-18) is likely to be e-logbook testing
- There is limited capacity to fill in e-logbooks on board, and KKP is not set up for e-logbook submissions for vessels < 30 GT (no regulatory requirement)

Impact Evaluation

Outcome 2: Welfare and livelihoods of fishers and their dependents improved using satellite-based communication and VMS technology

Relevance

- In the handline fisheries the long duration and coordinated nature of fishing suggests that SMS communication is ideal to assist fishers in improving their fishing efficiency and profitability
- In Larantuka, even with short trip durations, the SMS communication can benefit captains to find fishing locations and assist with speedier logistics in port.
- SMS communication and vessel tracking are relevant to other parts of the value chain
- The generic term ‘VMS’ as used by the project for the Pointrek equipment is both misleading and open to misinterpretation

Impact Evaluation

Outcome 2: Welfare and livelihoods of fishers and their dependents improved using satellite-based communication and VMS technology

Effectiveness

- Pointrek support is largely adequate but software through integrating admin procedures could be improved
- Power issues are still a main issue for some users, although those who use it regularly have sought solutions.
- The equipment proven to improve the efficiency of fishing trips in terms of reducing costs and increasing catch size and value, if used properly.
- Logistical efficiencies can be improved through good communication and vessel tracking.
- Some LTUKA owners stated in the high season, 1 or more extra trips in each month could be made due to efficiencies to logistics management in turning boats around in port due to advance communication of catch size and arrival times.

Impact Evaluation

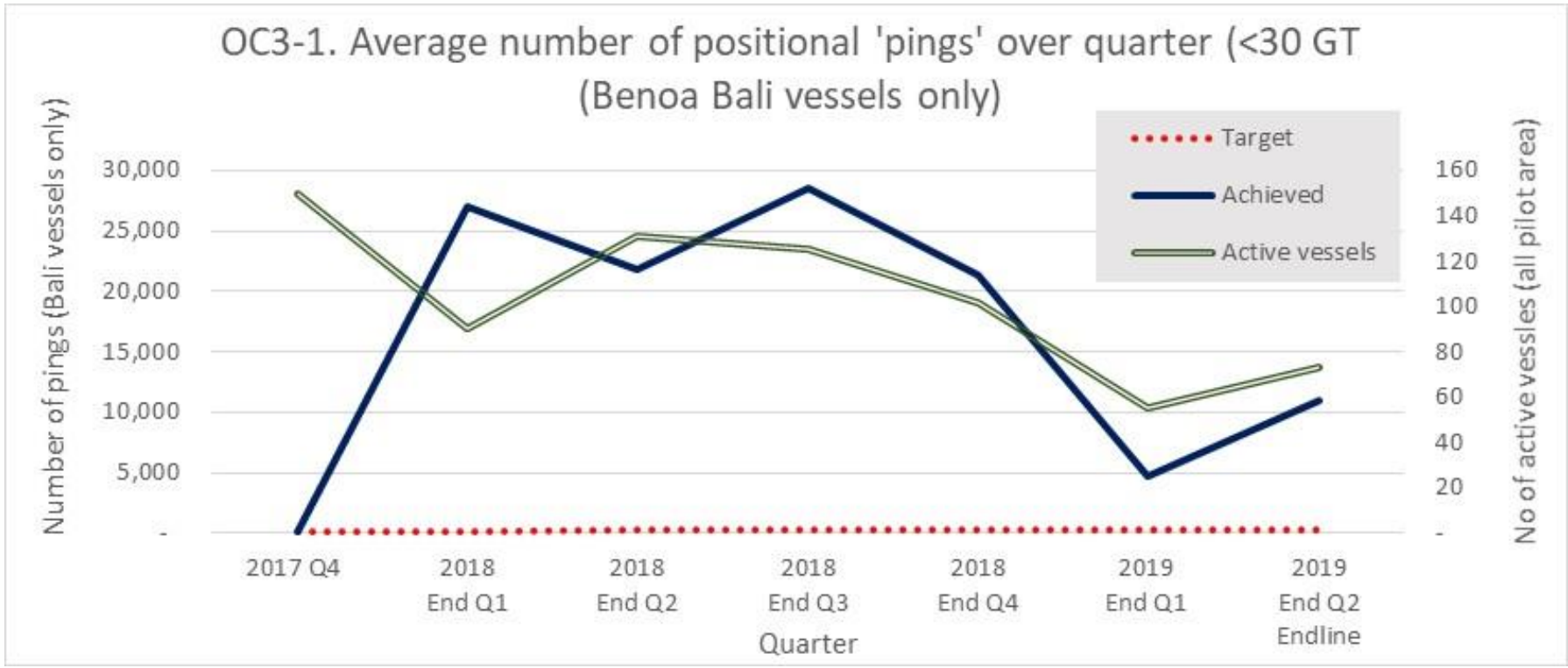
Outcome 2: Welfare and livelihoods of fishers and their dependents improved using satellite-based communication and VMS technology

Emerging Impact	• Vessel profitability and crew incomes can be considerably increased through use of Pointrek and its associated apps. • There is considerable variation between fisheries and vessels in terms of impact on vessel profitability • Boats with higher SMS use for logistics and fishing related decision making had significantly higher catch and gross margins than those who made little or no SMS use • More awareness raising and understanding is required as to why many pilot boats do not use the SMS app
Sustainability	• Main users of the equipment are the vessel coordinators and vessel owners. • The more experienced captains are likely to continue using Pointrek after the pilot project. • Further adoption depends on the new SMS package cost (deemed an improvement and affordable) and the cost of hardware.

Impact Evaluation

Outcome 3: Levels of IUU fishing reduced through targeted monitoring, control and surveillance (MCS) resulting from the use of satellite-based communication and VMS technology

OC3-1. Average number of positional 'pings' over quarter (<30 GT (Benoa Bali only)

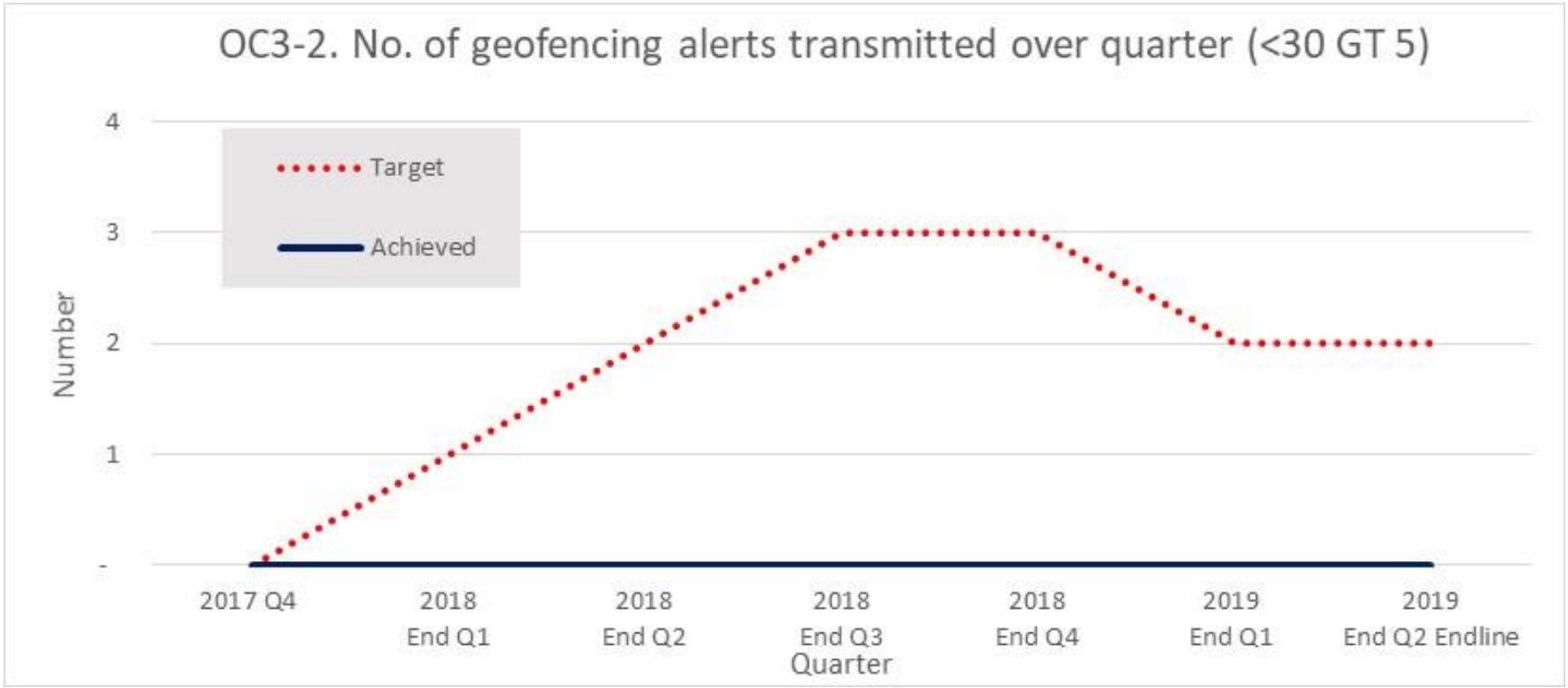


- The number of positional 'pings' from the VMS transmitter indicates the extent to which the VMS unit is being kept switched on. It may also be influenced by the level of fishing activity undertaken over the quarter.
- After an initial gain, ping levels seem to have declined over the last six months. Q1 is normally quiet (many HL vessels are in Srijai)

Impact Evaluation

Outcome 3: Levels of IUU fishing reduced through targeted monitoring, control and surveillance (MCS) resulting from the use of satellite-based communication and VMS technology

OC3-2. No. of geofencing alerts transmitted over quarter (<30 GT)

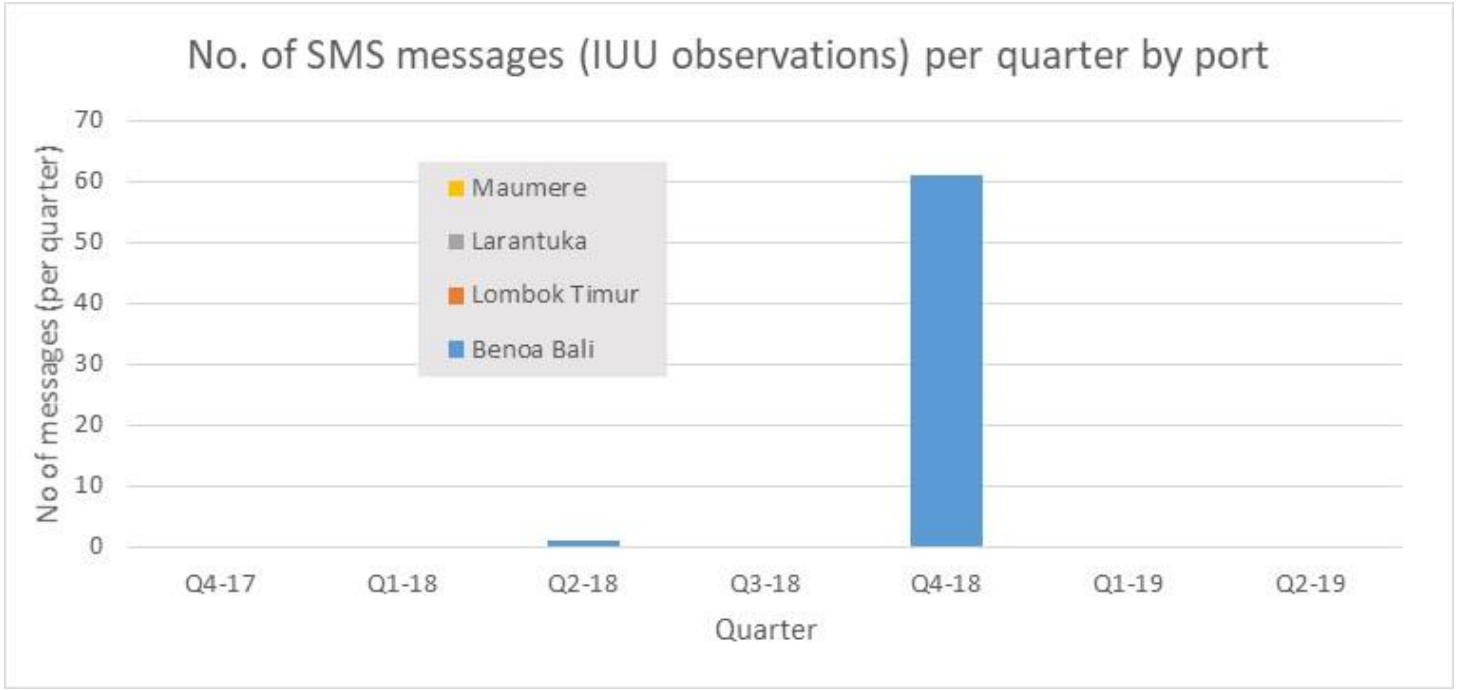


- Geofencing capability was installed in Phinisi in early 2018 but has not been used to date.

Impact Evaluation

Outcome 3: Levels of IUU fishing reduced through targeted monitoring, control and surveillance (MCS) resulting from the use of satellite-based communication and VMS technology

OC3-3. No. of reported observations of IUU events by third parties encountered by pilot vessels per quarter (<30 GT)



- The Theory of Change presumed that the SMS facility could be used by fishers to report illegal fishing activity to the authorities
- Actual IUU reporting has been very limited, except over Q4-18 by hand line vessels in Bali
- FGD (Lombok) suggest that fishers are unwilling to report other fishers, even for IUU behaviour, possibly for personal safety reasons

Impact Evaluation

Outcome 3: Levels of IUU fishing reduced through targeted monitoring, control and surveillance (MCS) resulting from the use of satellite-based communication and VMS technology

Relevance	• At present there is no official regulation that requires VMS to be installed on vessels < 30 GT. • There are no major IUU issues known to be associated with the <30 GT fleets. • For vessels < 30 GT, PSDKP are mainly focused on cross-checking the fishing areas reported in landing reports with historical VMS data, rather than monitoring live fishing activity
Effectiveness	• <30 GT vessels have been transmitting VMS data on their position, speed and track for the first time in Indonesia. But active vessels declined from 150 (Q3-17) to 56 (Q1-19) as not required by law….. • Power issues and the deliberate disabling of VMS transmissions need to be addressed.

Impact Evaluation

Outcome 3: Levels of IUU fishing reduced through targeted monitoring, control and surveillance (MCS) resulting from the use of satellite-based communication and VMS technology

Effectiveness (continued)	• A geofencing capability has now been introduced to ensure vessels are complying with their geographical license conditions. • The 'Phinisi' VMS software is now being installed in the Fisheries Monitoring Centres in Jakarta MMAF and the UPT in Benoa Bali in May 2018 (who initially used it daily for 30 minutes, but not now). • To date, there has only been a limited use of <30 GT VMS data by PSDKP to reduce IUU fishing, although this is beginning to change

Impact Evaluation

Outcome 3: Levels of IUU fishing reduced through targeted monitoring, control and surveillance (MCS) resulting from the use of satellite-based communication and VMS technology

Emerging Impact	• VMS data has proved useful when cross-checking landing reports with declared fishing areas. • Jurisdictional and legislative constraints are preventing VMS data from being used to deter <30 GT vessels suspected of IUU behaviour. • Pilot vessels are unwilling to report suspected IUU behaviour to the authorities
Sustainability	• The new *Phinisi* VMS software is popular but needs improvements, esp. to allow high resolution vessel tracking. • However there is a risk that pilot vessels may switch off the VMS function after project funding ceases. • This system would allow the rapid enforcement of IUU fishing should legislation be introduced mandating the use of VMS equipment of vessels 10-30 GT.

Impact Evaluation

Outcome 4: Improved capacity to plan and implement monitoring, control and surveillance (MCS) within the national and local government

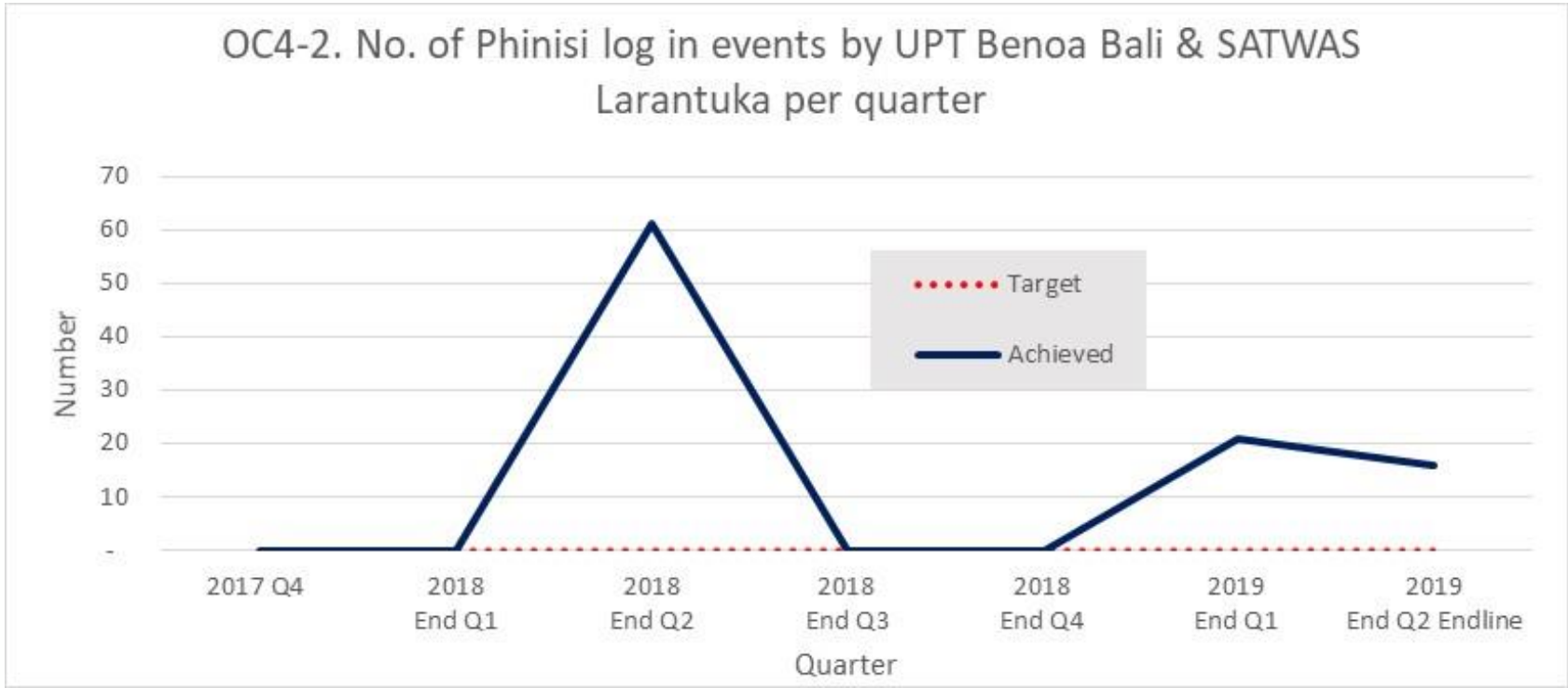
OC4-1. No. of actions taken against potentially non-compliant pilot vessels (<30 GT)

- As there is no requirement for vessels <30 GT to have VMS, VMS evidence cannot be used to instigate action against these vessels
- However it was possible to issue a letter of warning, but this was never used, possibly due to the high compliance levels of both fleets.
- No baseline or target was possible with this indicator.

Impact Evaluation

Outcome 4: Improved capacity to plan and implement monitoring, control and surveillance (MCS) within the national and local government

OC4-2. No. of Phinisi log in events by UPT Benoa Bali & SATWAS Larantuka per quarter



- Phinisi was installed into the PSDKP UPT in Benoa Bali and the PSDKP SATWAS office in Larantuka in Q2 2018
- Here was an initial flurry of use after installation, but this has since declined
- The system has been inaccessible from April – July 2019 due to a server change and has not been used over this period

Impact Evaluation

Outcome 4: Improved capacity to plan and implement monitoring, control and surveillance (MCS) within the national and local government

Relevance	• PSDKP remains responsible for ensuring the compliance of 10 - 30 GT fishing vessels at both national and regional levels. • Discussions with PSDKP at UPT and SATWAS levels reinforces the need for effective MCS capacity at regional level, especially for vessels 10-30 GT.
Effectiveness	• Checking and enforcing the compliance of 10 - 30 GT vessels is a relatively low priority for PSDKP and has thus receives less planning and operational time. • There is limited MCS planning for the <30 GT fleet, such as inclusion in risk-based control plans, Standard Operating Procedures or MoUs with other government authorities (e.g. the navy, coastguard or Marine Police).

Impact Evaluation

Outcome 4: Improved capacity to plan and implement monitoring, control and surveillance (MCS) within the national and local government

Effectiveness (continued)	• Whilst there is some formal cooperation between Government agencies combatting IUU, there is only limited joint planning and operations associated with vessels 10-30 GT at present. • It is difficult for PSDKP to respond to suspected IUU activity for vessels < 30 GT due to their limited legislative mandate. • BASARNAS has not yet been provided access to the VMS data which could potentially assist with their SAR operations

Impact Evaluation

Outcome 4: Improved capacity to plan and implement monitoring, control and surveillance (MCS) within the national and local government

Emerging Impact	• At this endline point stage there has been no real change in the way <30 GT vessels are controlled in the pilot FMAs. • There is a need to improve the capacity of PSDKP, especially at UPT and SATWAS levels, to interpret VMS data to assist in combatting IUU fishing under their jurisdiction
Sustainability	• At present there is insufficient institutional capacity at regional and UPT levels to fully utilise VMS and other digital data. This includes : 1. VMS vessel position feeds 2. E-logbook data; and 3. Electronic administrative submissions

Impact Evaluation

Outcome 5: A low cost affordable VMS+ model relevant to <30GT fishing vessels that is integrated into the Indonesian MCS system, is fully tested and completed with successes and outcomes shared widely with the development community

OC5-1. Completed technical / commercial model together with affordable low-cost package for vessels <30 GT fully tested and completed ready for roll out

- Technical model finalized, but low-cost business model has been developed. A low-cost package is yet to be agreed.

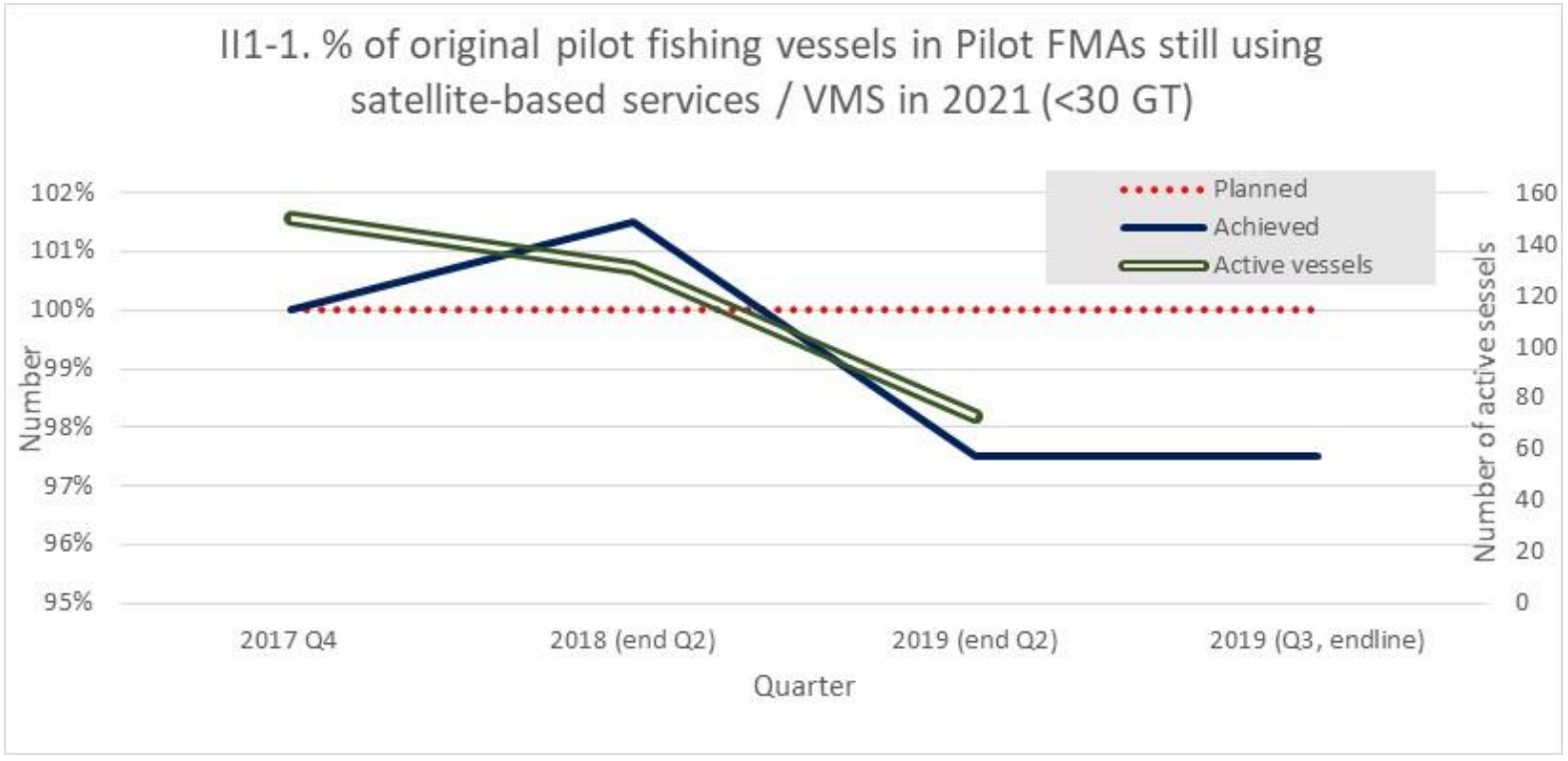
OC5-2. KKP makes necessary changes to regulatory framework to include <30GT vessel class for mandatory VMS use

- Regulation for legal requirement of VMS on vessels 20 – 30 GT under consideration by PSDKP, but no regulatory development to date.

Impact Evaluation

Impact 1: The safety, productivity and food security of Indonesian fishers and their communities enhanced through the expansion and adoption of VMS

II1-1. % of original pilot fishing vessels in Pilot FMAs still using satellite-based services / VMS in 2021 (<30 GT)

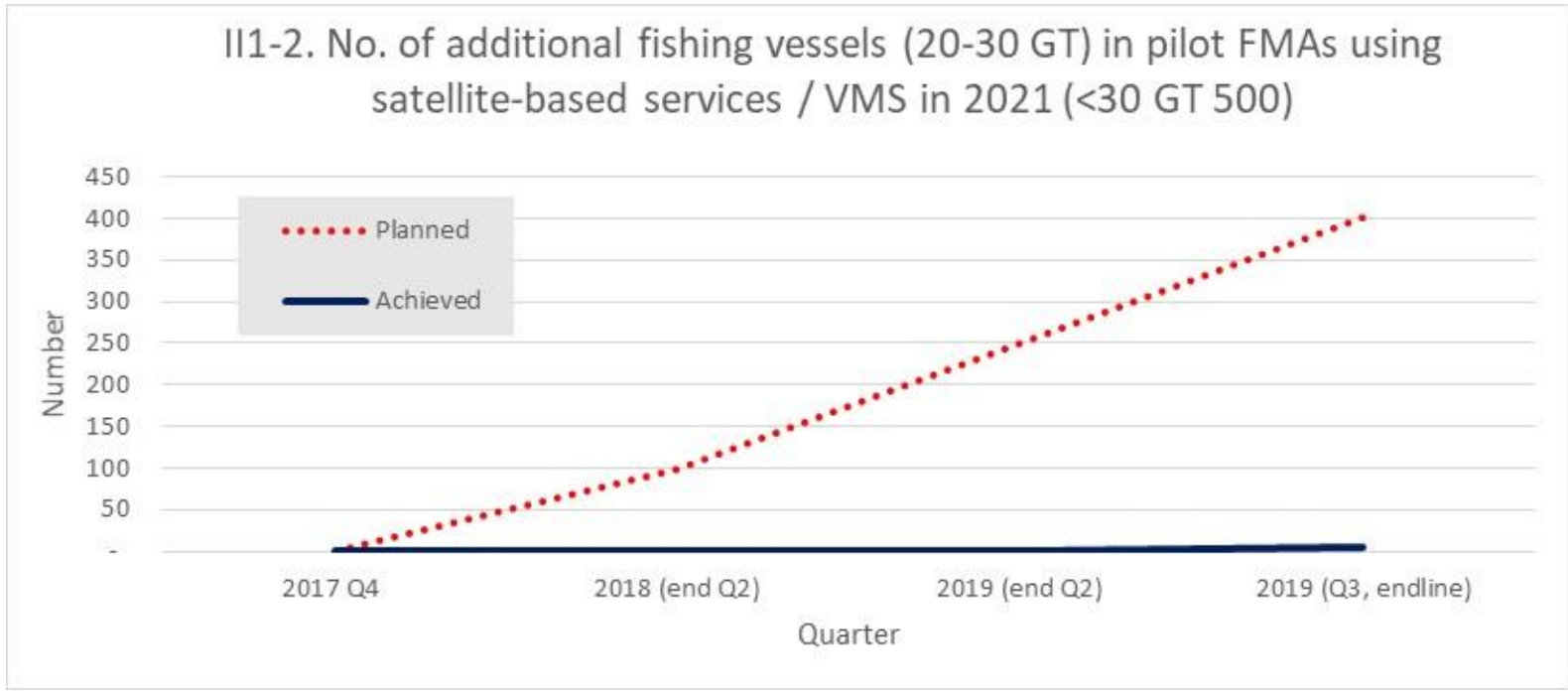


- 195 (97.5%) of the original 202 vessels equipped with PointTrek are still actively using the VMS+ solution.
- The original target of 100% use was probably over-optimistic, and retention has been consistent over the last six months of the pilot project.
- This will be a key variable for investigation over the legacy evaluation.

Impact Evaluation

Impact 1: The safety, productivity and food security of Indonesian fishers and their communities enhanced through the expansion and adoption of VMS

II1-2. No. of additional fishing vessels (20-30 GT) in pilot FMAs using satellite-based services / VMS in 2021 (<30 GT)

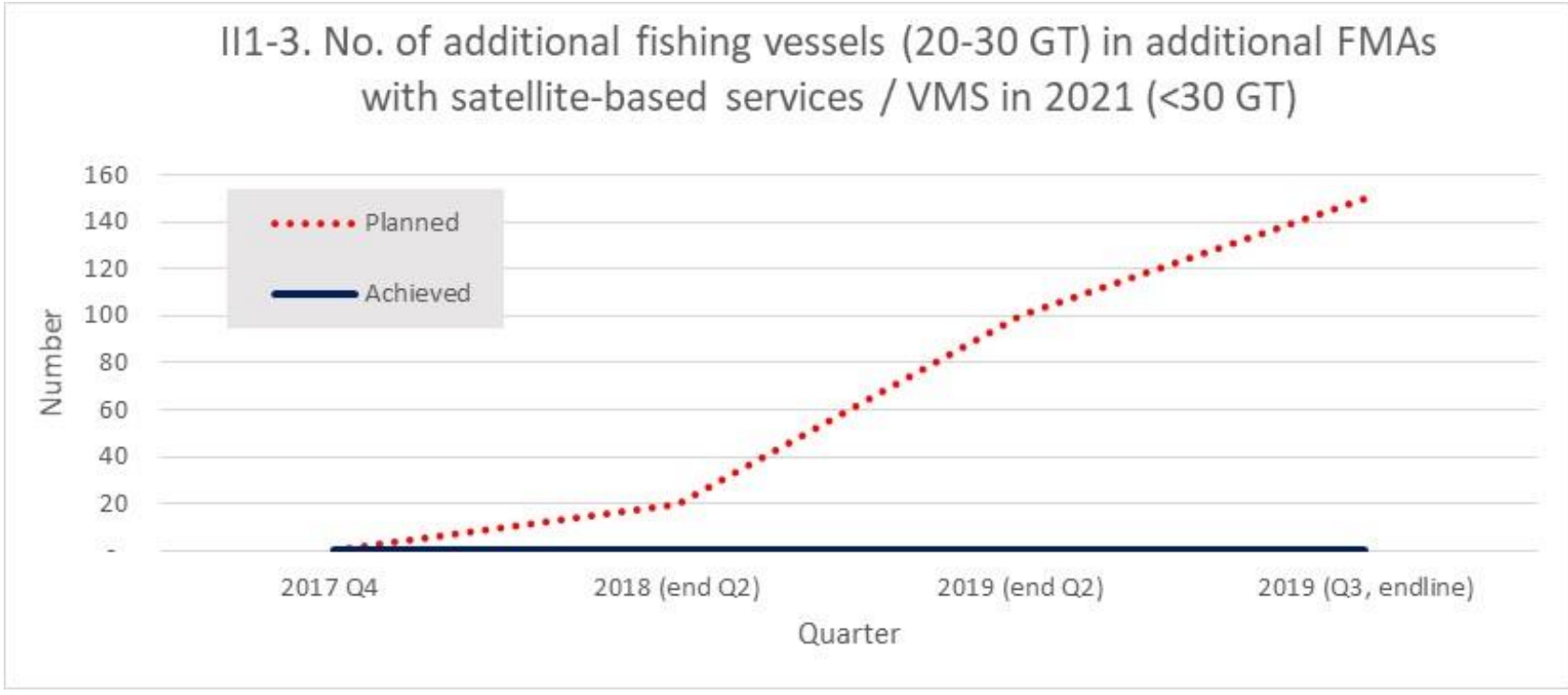


- Based on initial interest expressed at the beginning of the project, it was assumed that up to 400 vessels outside the pilot would adopt the IDP-based PointTrek system within FMAs 713, 714 & 573 over the pilot as the project progressed.
- At this point, four new installations have taken place outside the pilot project.

Impact Evaluation

Impact 1: The safety, productivity and food security of Indonesian fishers and their communities enhanced through the expansion and adoption of VMS

II1-3. No. of additional fishing vessels (20-30 GT) in additional FMAs with satellite-based services / VMS in 2021 (<30 GT)



- Based on initial interest expressed at the beginning of the project, it was assumed that up to 200 vessels outside the pilot would adopt the IDP-based PointTrek system outside FMAs 713, 714 & 573 over the pilot as the project progressed.
- At this point, no further installations outside the pilot FMAs have taken place.

Impact Evaluation

Impact 1: The safety, productivity and food security of Indonesian fishers and their communities enhanced through the expansion and adoption of VMS

II1-4.Accumulated total additional vessel earning per trip for all vessels in pilot fleets from Lombok and Larantuka (total net benefit) from April 2018 to date compared to Control boats (GBP)

- Total incremental income generated between April 2018 to June 2019 to pilot fleet = GBP 196,253 or 5.56 billion IDR (195 boats, 15 months benefit, average trips per month).

Calculation: difference in total average gross margin per trip between Sentinel and Control x No. of trips made each month x No. of pilot boats = total accumulated incremental net income for pilot boats between April 2018 and June 2019 (in Larantuka and Lombok, and estimated for Benoa and Maumere)

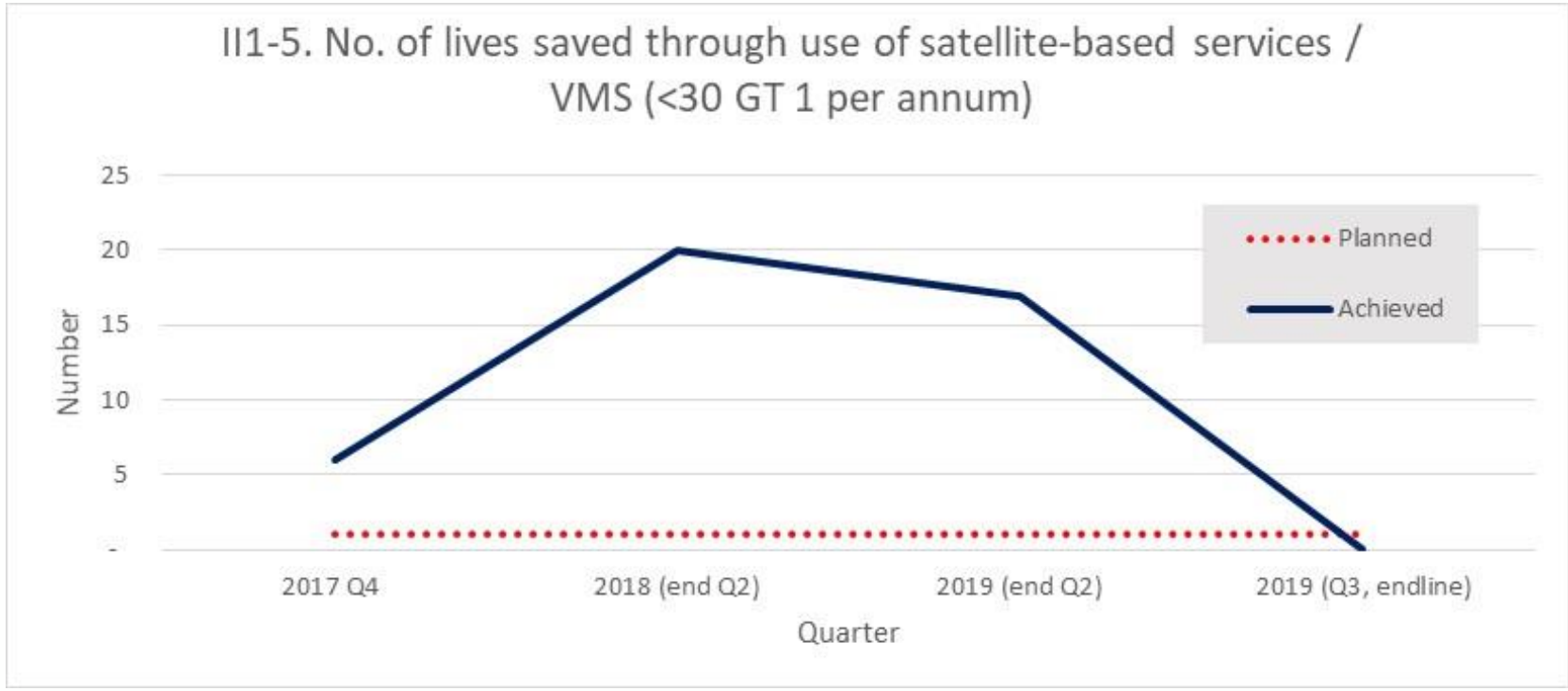
Table: Accumulated Incremental Net Income by pilot fleet/harbour (april 2018 - June 2019)

Site	Fishery	No. of boats	Total incremental value IDR	Total incremental value GBP
LOMBOK	Handline	85	2,135,480,135	£124,489
BENOA	Handline	49	1,231,041,489	£71,764
LARANTUKA	Pole&Line	50	1,797,589,746	£104,791
MAUMERE	Pole&Line	11	395,469,744	£23,054
Total		195	5,559,581,114	£196,253

Impact Evaluation

Impact 1: The safety, productivity and food security of Indonesian fishers and their communities enhanced through the expansion and adoption of VMS

II1-5. No. of lives saved through use of satellite-based services / VMS (<30 GT sentinel vessels)

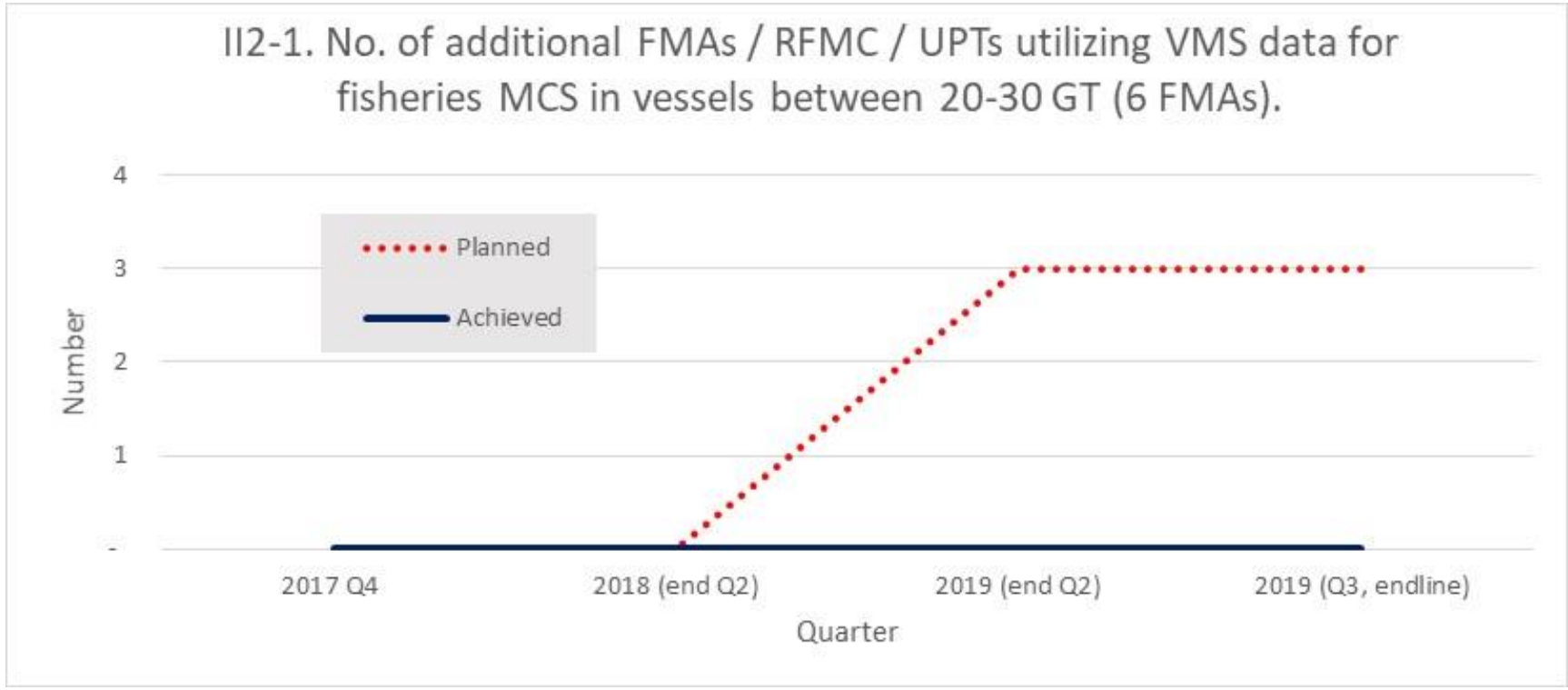


- The project has so far saved around 43 lives from vessels that either sank (n=1) or were incapacitated (n=2).
- The original target was one life per year – this was based on very little data (no records are kept for these fleets).
- Trend analysis is not appropriate for this indicator.

Impact Evaluation

Impact 2: The effectiveness of monitoring & enforcement efforts by the authorities improved through technology & process improvements

II2-1. No. of additional FMAs / RFMC / UPTs utilizing VMS data for fisheries MCS in vessels between 20-30 GT (6 FMAs).

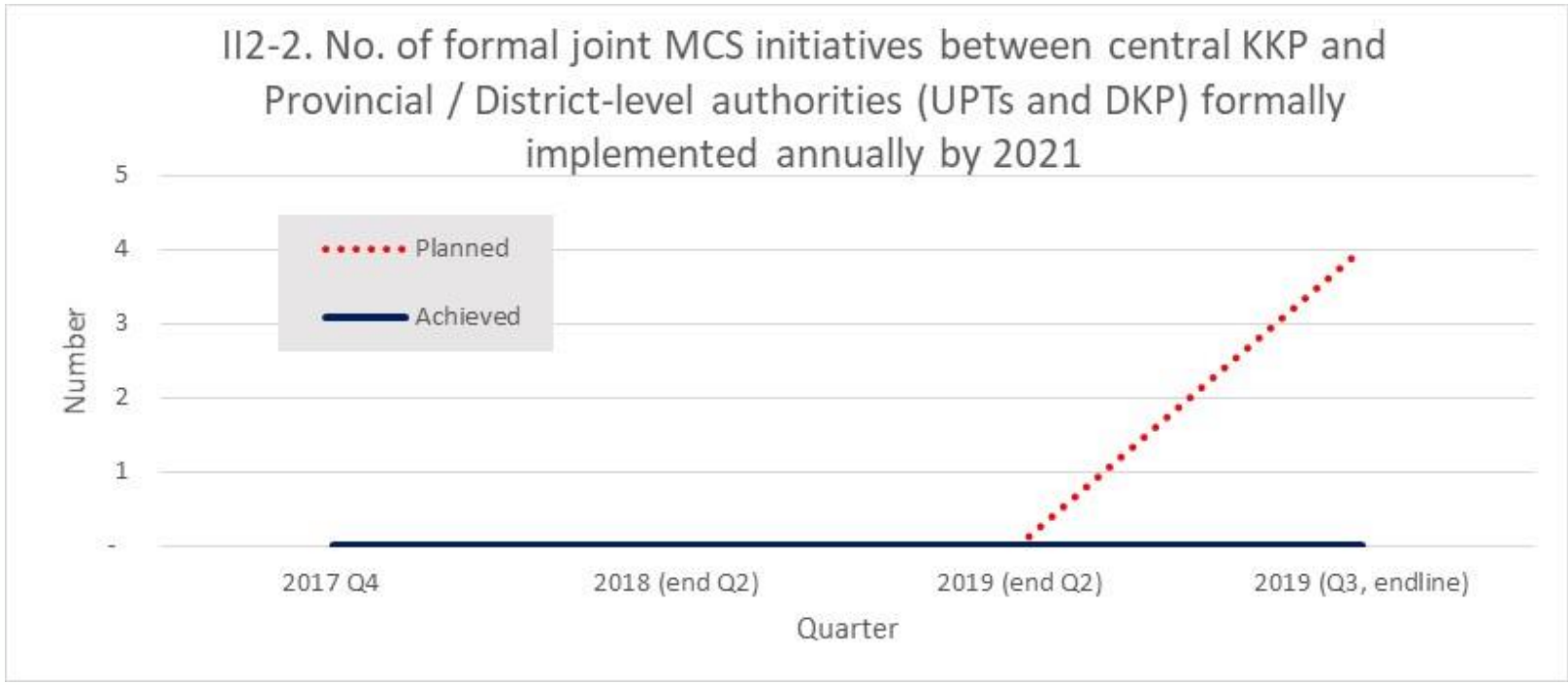


- It was assumed that other fisheries monitoring centres might adopt the system if additional non-pilot vessels in other FMAs (see indicator II1-3) were to adopt PointTrek / other ISP-based VMS solutions.
- None have – this is likely due to the lack of any legislation requiring vessels <30 GT to install VMS equipment.

Impact Evaluation

Impact 2: The effectiveness of monitoring & enforcement efforts by the authorities improved through technology & process improvements

II2-2. No. of formal joint MCS initiatives between central KKP and Provincial / District-level authorities (UPTs & DKP) formally implemented annually by 2021



- It was assumed that as <30 GT vessels started to use VMS equipment and could be tracked by PSDKP at both central and regional (e.g. UPT and the lower SATWAS levels), this would lead to increased cooperation between central KKP and these regional bodies in MCS
- None have – this is likely due to the lack of any legislation requiring vessels <30 GT to install VMS equipment.

Project Sustainability

Sustainability Criteria	Sustainability Rating *Midline*	*Endline*
1. Ownership by beneficiaries	HIGH	MODERATE
2. Policy support	LOW TO MODERATE	LOW
3. Appropriate technology	MODERATE TO HIGH	MODERATE
4. Environmental sustainability	LOW TO MODERATE	MODERATE
5. Socio-cultural issues	HIGH	HIGH
6. Gender	HIGH	HIGH
7. Institutional & management capacity	MODERATE	LOW TO MODERATE
8. Economic and Financial viability	HIGH	MODERATE

LOW	←→	MODERATE	←→	HIGH

Overall findings

- Vessel tracking via relatively low cost IDP terminals is technically possible on <30 GT vessels, providing sufficient power solutions (e.g. solar, DC converters) are provided
- VMS+ on <30 GT vessels saves lives, reduces vessel losses and provides confidence to crews, owners and their families
- Those boats taking full advantage of the VMS+ benefits are more profitable and are likely to continue use after the pilot …….however these are a small proportion of the pilot fleet – possibly <20%.
- VMS+ has also benefited the vessel coordinators to reduce their logistics costs and time as well as to enhance the safety and productivity of their vessels.
- PSDKP has not taken advantage of the <30 GT VMS tracking data available through Phinisi despite its proven ability to track these vessels. This is mainly due to a lack of mandate to regulate vessels < 30 GT.

Next steps and recommendations

- **Legacy evaluation**
  - Will be undertaken in 2020 (March, June or Sept, to be confirmed)
  - Will need to assess how may boats are actually continuing use of VMS+ at their own cost
  - Will need to determine why vessels not continuing to use VMS+ have discontinued use.
  - Review and evaluate any progress made in the use of <30 GT VMS data in government MCS activities.
- **Recommendations**
  - A VMS-based spatial analysis of vessel behaviour over pilot is undertaken.
  - Cross-correlation between cost-earnings data and fishing effort.
  - Further capacity-building is provided for both VMS+ users and government to consolidate potential sustainability and future impact

Baseline Assessment for the >30 GT Vessels

The Project Proposition

Theory of Change

PROBLEM STATEMENT

Intermittent and unreliable VMS transmissions reduces ability of PSDKP to detect IUU behaviour

Narrow bandwidth limits electronic reporting & monitoring as well as data and voice-based communication

ACTIVITIES	OUTPUTS	OUTCOMES	IMPACTS
Install 100 *Fleet One* units on vessels >30 GT. Train 100 captains and crew on equipment operation & use. Integrate >30 GT VMS data feeds into PSDKP Fisheries Monitoring Centre.	*Fleet One* installed, functioning & activated on 100 fishing vessels > 30 GT. Added value applications installed and being used on a regular basis. Reliable VMS feeds from vessels >30 GT accessed by PSDKP for fisheries management purposes.	>30 GT pilot fleet spending more time at sea as KKP confidence in vessel compliance increases. >30 GT pilot fleet operating Fleet One over full trip duration, inc. when in port. Reduced VMS downtime resulting in less opportunity for IUU fishing behaviour.	Improved compliance with fisheries management regulations & reporting.

The Project Proposition

Logical Framework Analysis (Impacts and Outcomes)

IMPACT	Impact Indicator (II)
Improved compliance with fisheries management regulations & reporting	II 1.1 Decrease in IUU fishing risk (metrics to be agreed with PSDKP - R-VIA?).
	II 1.2 Increased vessel reporting rates (metrics to be agreed with PSDKP - SKAT letters?).

OUTCOME 1	Outcome Indicators (OC) 1
>30 GT pilot fleet working more profitably due to more targeted fishing and more efficient logistics	OC 1.1 Rates of replacement of existing equipment with integrated Fleet One solution (outside of pilot).
OUTCOME 2	**Outcome Indicators (OC) 2**
>30 GT pilot fleet operating Fleet One over full trip duration, with reduced VMS downtime resulting in less opportunity for IUU fishing behaviour	OC 2.1 Percentage of VMS downtime over total time when vessel is operations (in port or at sea) reduced.

The Project Proposition

Logical Framework Analysis (Outputs)

OUTPUT 1	**Output Indicator (OP) 1**
Fleet One installed, functioning & activated on 100 fishing vessels > 30 GT.	OP 1.1 Number of vessels actively using Fleet One when operational.
OUTPUT 2	**2.1 Output Indicator (OP) 2**
Added value applications installed and being used on a regular basis.	OP 2.1 Data volumes via VMS, crew communication apps & e-logbook reporting. 2.1.1 IDP VMS data volume 2.1.2 VMS+ VMS data volume 2.2.3 VMS+ SMS data volume 2.2.4 VMS+ other data volume
OUTPUT 3	**Output Indicators (OP) 3**
Reliable VMS feeds from vessels >30 GT accessed by PSDKP for fisheries management purposes.	OP 3.1 VMS feed rates 3.1.1 Number of pings per vessel / month

Potential Indicators

Output level

- Need historic data (1-3 years prior to Fleet One installation
- To be monitored over pilot project period (6 months to 1 year, tbc)

Indicator	Metrics	Source
OP 1.1 Number of vessels actively using Fleet One when operational	1.1.1 Number of vessels actively using Fleet One when operational.	Service Provider
OP 2.1 Data volumes via VMS, crew communication apps & e-logbook reporting.	2.1.1 IDP VMS data volume	Service Provider
	2.1.2 VMS+ SMS data volume	Service Provider
	2.1.3 VMS+ Other data volume	Service Provider
OP 3.1 VMS feed rates	3.1.1 Number of pings per vessel / month	Service Provider

Potential Indicators

Outcome level

- Need historic data (1-3 years prior to Fleet One installation
- To be monitored over pilot project period (6 months to 1 year, tbc)

Indicator	Metrics	Source
OC 1.1 Rates of replacement of existing equipment with integrated Fleet One solution (outside of pilot).	Number of unsubsidised Fleet One units installed in Indonesia outside of the pilot project	Inmarsat / Service Providers
OC 2.1 Percentage of VMS downtime over total time when vessel is operations (in port or at sea) reduced.	Ping-based? At sea only (how?)	??

Potential Indicators

Impact level

- Need historic data (1-3 years prior to Fleet One installation)
- To be monitored over pilot project period (6 months to 1 year, tbc)

Indicator	Metrics	Source
II 1.1 Decrease in IUU fishing risk	Via R-VIA? Other (to be developed)?	Inmarsat / Service Providers
II 1.2 Increased vessel reporting rates	Metrics to be agreed: Reduction in SKAT letters refusal letters?	PSDKP

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Appendix G: Endline M&E Workshop - Minutes

WORKSHOP AGENDA

The workshop was held on Thursday, August 1st 2019 in Bogor.

Time	Description
8.30 – 8.45	Registration
8.45 – 9.00	Welcome and opening Welcome from KKP Welcome from the M&E Team
9.00 – 10.00	Presentation and discussion of the M&E findings (Session 1) Outcome 1: Improved safety at sea Outcome 2: Improved livelihoods
10.00 – 10.15	Break
10.15 – 11.15	Presentation and discussion of the M&E findings (Session 2) Outcome 3: Reduced illegal fishing (IUU) Outcome 4: Improved Monitoring Control and Surveillance (MCS) Outcome 5: Affordable VMS/Communication model relevant to <30 GT vessels that is integrated and adopted into the Indonesian MCS system.
11.15 – 12.30	Discussion of findings, recommendations and next steps
12.30 – 13.30	Lunch
13.30 – 13.45	M&E Framework ▪ Theory of Change ▪ Logical Framework Analysis
13.45 – 14.45	Discussion of Potential Indicators ▪ Outputs, Outcomes & Impacts
14.45 – 16.15	Updates on other work packages ▪ Patrol boat trial ▪ *Phinisi* app development ▪ Low cost terminal manufacturing ▪ Policy paper for VMS for <30 GT vessels ▪ Direct data feed
16.15 – 16.30	Wrap-up and closure of Workshop

WELCOME AND OPENING

The workshop was opened by Pak Yeppi Sudarja (Deputy Director, Monitoring and Control Center, PSDKP) who explained the background to the project, the objectives and issues arising from his perspective including importance of the patrol boat trails using GX hardware and their positive impression of the results.

With regard to the M&E evaluation, the PSDKP Director would judge on how good or bad the evaluation results were on the project and future direction. Tim Huntington (Director, Poseidon) also gave a welcome speech and shared the endline evaluation steps from the visit to Bali, Lombok and Kupang together with Ibu Mai (Public Relation and International Cooperation Bureau) and two other colleagues from the Directorate of Licensing, to the workshop.

DISCUSSION OF THE M&E FINDINGS (SESSION 1)

Poseidon team (Tim Huntington and Willie Bourne) presented the findings for Outcome 1: Improved safety at sea and Outcome 2: Improved livelihoods. Discussions on this session were noted below.

Feedback 1:

Yeppi (Monitoring and Control Center, PSDKP):

- How many vessels were used for control and sentinel?
- Same number of trips for Lombok and Larantuka?
- Were the same trips used for the data collected?
- Are the results statistically significant? The increase in catch is significant and the graph fluctuates too much between control and sentinel fleets. There is no consistent trend so the results may not be statistically significant.

Response:

- The number of vessels and trips for control and sentinel in Lombok is different because of the challenge on collecting data from control vessel voluntarily. The number of boats was similar for control and sentinel in Larantuka because both vessels are coordinated by one person (Pak Hilmar), so it was easy to ask the vessels to provide data.
- It was noted that in Lombok there were up to 10 Sentinel / 5 control vessels and in Larantuka up to 10 sentinel; 5 control vessels. A total of 294 boat samples (both Sentinel and Control fleet) was recorded between September 2017 and June 2019.
- The difference between the Sentinel and Control fleets for many of the indicators was not very large because not all sentinel vessels regularly use the SMS feature. When a comparison is made with one vessel (in this case Flotim 24 from Larantuka) who used the SMS feature consistently, the difference with this boat compared to the Control boats was significant, for example, demonstrating catch size, gross margin per trip and average income per trip per crew member to be more than 30% difference than the control vessel group.

Feedback 2:

Suryanto (Fisheries Research Center):

- What the theory is between use of SMS through VMS+ and the presented results on the increased average income per trip?

Response:

- The theory is using communication, the vessel can communicate with other vessels and people in land. Because the vessels are operating in a group, they can talk with their friends about the location of the fish. The vessel can also tell the coordinator which FAD that has fish and which not so that the coordinator can inform other vessels.

DISCUSSION OF THE M&E FINDINGS (SESSION 2)

Poseidon team (Tim Huntington and Willie Bourne) presented the findings for Outcome 3: Reduced illegal fishing (IUU), Outcome 4: Improved Monitoring Control and Surveillance (MCS), and Outcome 5: Affordable VMS/Communication model relevant to <30 GT vessels that is integrated and adopted into the Indonesian MCS system. Discussions on this session were noted below.

Feedback 1:

Mumpuni (Fisheries Resource Management, DG Capture Fisheries):

- What are the indicators of IUU fishing reduced – can you show before and after?
- What IUU issues arise in our area?
- Who has access to *Phinisi*?

Response:

- None really as the fishing fleets in Lombok and Larantuka are fairly compliant – these fleets are not misbehavior. So proxy was number of pings in different area and the MCS response.
- At the moment, the command center PSDKP Benoa, Larantuka and Research center have access to *Phinisi*.

Feedback 2:

Marza Ihsan (Research Center):

- Is it possible to compare and conclude which system is important for fisherman or for SMS or both?
- Find tracking data – access of the data?

Response:

- SMS data is more important than tracking data for fishing; However, SMS message sent "help we are sinking" it automatically includes the coordinates.
- The data belongs to KKP Command Center through *Phinisi*. Anyone can coordinate with KKP command center.

Feedback 3:

Mochammad (Directorate of Licensing, DG Capture Fisheries):

- Vessel <30 GT – issue related the authority limited to the province and secondly IUU problems are mostly related to license in different IPP fishing areas (WPP), especially temporary fishermen license.
- Gross Margin – benefit of 90 kgs – does it cover the cost of the VMS?
- In other areas where vessels targeting lower value species, will this solution work?
- <10 GT or 10 to 30 GT – under <10 GT they need to have correct license and fish within 12 nm limit.

Response:

- An extra 90kg per trip is cost effective and easily covers the cost of the monthly package. Not to forget the other benefits related to lives saved at sea, logistic cost reduction and marketing aspects improved by SMS communication.
- Now SISFO is developing the geo-fencing application onboard that will give a pop up notification on the tablet if the authorities said that the vessel went out of the area, but the fishermen say that they did not know but if they switch on the VMS then they would see this.
- Considering lower value species is a good point. The cost-earnings model shows that, when used well, SMS -based communications can offset their costs through more efficient fishing, especially when fishing in groups for high value tunas, often destined for export. However this may not be so with lower value species e.g. sardines, and this needs to be assessed.

Feedback 4:

Suryanto (Fisheries Research Center):

- In 2000, there was a similar project using handie talkie and was supported by the ability to make phone calls to the house but did not get permission from TELKOM at that time. This trial experienced many frequency disturbances.
- He believes that if the pilot project is carried out in Eastern Indonesia, the project will definitely be accepted by the people there. Because the people of East Indonesia tend to accept new things and are very enthusiastic about all similar projects held there.

Feedback 5:

Yeppi (Monitoring and Control Center, PSDKP):

- We always lose data on small vessels of tuna products, and it is hoped that in this project we will get a model because international market needs require traceability of fish;
- Only 20% of boats would continue to use the system?
- The results have not yet lead to the recommendation that the 20-30 GT should have a VMS.
- The VMS is also an interest for fishermen to support safety aspects.

Response:

- Legacy evaluation would prove how many boats that will continue to use the system. The 20% was a rough estimate.
- The M&E findings only presented data and preliminary analysis. Hatfield will use the data to update the policy paper and this will be shared to KKP. The background paper provided recommendations and pros and cons on regulating VMS for below 30 GT vessels.

Feedback 6:

Lola (Public Relation and International Cooperation Bureau):

- Regarding the background/policy paper, the project team had given the document to KKP and are awaiting feedback. KKP wants to see the final evaluation results first before providing feedbacks on the background/policy paper. Several options considered for example if the regulation is needed for 10-30 GT or 20-30 GT, or based on the catch, related to traceability for the Indonesian government's efforts to increase exports, small vessels that catch tuna are also likely to be installed by VMS.

Response:

- The team is now updating the background/policy paper. However feedback to the first version would help improve the updated version. It would be great if KKP would point out parts of the report they would like improved.

Feedback 7:

Sigit (Hatfield):

- Vessel below <12 nm – PSDKP or DKP – who catches them if they do IUU fishing?

Response (Yeppi):

- If any vessel fishing beyond 12 nm then PSDKP will then send letter. PSDKP is not authorized to revoke the vessel operating permit, the licensing directorate has the authority after obtaining the BAP (investigation report) from the PSDKP.
- A number of violations indicated will be checked again by the PSDKP team to prepare the BAP.

Feedback 8:

Tim (Poseidon):

- Why was not *Phinisi* fully utilized – was it lack of regulation or resources or both?

Response (Yeppi):

- They are trying to update existing system to *Phinisi* as they want it – need regulation; enough staff in KKP but need additional resources and equipment for <30 GT at provincial level. There needs an MOU between province and KKP linked to the license department.

Conclusions: for boats exporting, the VMS is essential. For lower sized vessels then there is a need to review information to determine the viability of cost over catch size especially in areas where the catch is of less valuable species.

UPDATES ON OTHER WORK PACKAGES

Feedback on Phinisi

Zul is working on migrating the over 30GT database on *Phinisi*, therefore KKP cannot use it yet. KKP staff in the command center had a training already. Once it's ready, they will start using *Phinisi*. Zul will meet KKP again to provide updates.

Low Cost Terminal

- KKP is asking cost of the terminal. This will be provided on return of Erwis (Inmarsat Batam) end of the month.
- KKP is asking for dates of pilot and they will participate.

Policy Paper

Inmarsat is requesting active review by KKP of the policy paper including the theory of change for the welfare of the fishers as well as suggestion for regulation for vessels from below 30GT.

Question about the information sharing with BASARNAS

The field coordinator or SP contacting BASARNAS to confirm that the SOS is a valid alert.

WRAP-UP AND CLOSURE OF WORKSHOP

Tolga Ors (Inmarsat) thanked the participants for giving feedbacks and attending the workshop. Pak Agung (Public Relation and International Cooperation Bureau) mentioned that the Secretary General had confirmed his attendance to the closing meeting in September. Together with Hatfield, the Public Relation and International Cooperation Bureau will coordinate and prepare for the meeting, including what needs to be highlighted during the meeting e.g. benefits for <30 GT, patrol boat, and low cost terminal. The workshop was closed by Pak Yeppi who thanked all project team for the monitoring and evaluation. KKP awaits for the final report and will be shared to technical team for review once KKP received it.

LIST OF PARTICIPANTS

No	Name	Institution
1	Yeppi Sudarja	Directorate Fleet Operation and Monitoring, PSDKP
2	Agung TP	Public Relation and International Cooperation Bureau
3	Lola Dwi PS	Public Relation and International Cooperation Bureau
4	Aryan Siagian	PSDKP
5	Hotmaida Purba	Public Relation and International Cooperation Bureau
6	Aris Setiawan	Directorate Fisheries Resource Management, Capture Fisheries
7	Mumpuni CP	Directorate Fisheries Resource Management, Capture Fisheries
8	Rista Devi Juniar	Directorate Fisheries Resource Management, Capture Fisheries
9	Prasetya Gunung P	Secretariat, PSDKP
10	Dewanto PB	PSDKP
11	Ariyanto	PSDKP
12	Marza Ihsan	Research Center
13	Danang Wijayajati	Directorate Fleet Operation and Monitoring, PSDKP
14	Suryanto	Fisheries Research Center
15	Nur Asiyah	Capture Fisheries
16	Marisye Lilipaly	Capture Fisheries
17	M Idnillah	Capture Fisheries
18	Sumiati	Capture Fisheries
19	Fariz Acron	Sisfo Indonesia
20	Tolga Ors	Inmarsat
21	Tim Huntington	Poseidon
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