



The use of the vessel monitoring system as fishery ship obligations in Indonesia

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Abstract. This research aims to investigate the government's efforts in tackling the practice of illegal fishing that has become a problem experienced by many countries, including Indonesia. Illegal fishing practices cause many disadvantages in the economic, environmental, and social sectors. This study employs a normative juridical approach supported by several investigations and findings of violations and the level of compliance of fishery business vessels in satisfying the vessel administration requirements. The results revealed that the government had made efforts to restrict fraudulent practices through a sophisticated technological device known as the Vessel Monitoring System (VMS) or Fisheries Vessel Monitoring System. The VMS system can monitor the movement of ships via satellite continuously so that fishing that does not comply with the permission will be identified. In the Ministerial Regulation No 42/Permen-KP/2014 concerning Fisheries Vessel Monitoring System, it is stipulated that any fishing vessel more significant than 30 Gross Tons operating in Indonesia's Fisheries Management Area and offshore must install a VMS transmitter. Therefore, the installation of VMS is fundamental and essential if fishing vessels aspire to do business in Indonesia. However, investigations related to compliance and sanctions if any ship either appears not to have installed a VMS or fishing without the permit need more attention in further studies.

Key Words: vessel monitoring system, vessel obligations, fishing vessel business requirements.

Introduction. As a maritime country with a more significant sea proportion compared to its land, Indonesia has plentiful resources of marine creatures. Those biological resources such as fish, shrimp, and other animals are fundamental in driving fishermen's livelihood. Furthermore, Indonesia is the world's second-largest producer of capture fisheries products, contributing 9.9 million tons in 2016, where 60% of them were coming from small scale fishers (Muawanah et al 2018), and there are 5.9 million fishermen who work in the capture fisheries sector (FAO 2018).

However, poor regulation regarding marine rules and systems can dissipate marine resources. For example, trawling at fish houses (rump on) without allocating chances for the fish to breed can damage the fish house. Besides, there are also many scandal cases where foreign vessels were illegally trespassing Indonesian waters (Waseso et al 2018). Such circumstances of crimes are called Illegal, Unregulated, and Unreported Fishing (IUUF).

Based on data released by the Anti-Corruption Clearing House (ACCH) in 2014, Task Force 115 evaluated and confirmed that 1,132 foreign and ex-foreign vessels did substantial violations. In terms of fisheries documents falsification, fisheries production in 2018 did not match the listed data. Production should have touched 7.4 million tons, but only 6 million tons were reported, which implies 1.4 million tons were unreported. Administratively, there are many forgeries of vessel documents, falsification of logbooks, and volume of vessels, which can affect fishing vessel licenses and duties (Hartriani 2017).

The application of a proper technology by multiple parties in the marine and fisheries industry is expected to overcome the IUUF problem. Rapid development in information and communication technology has the potential to strengthen existing marine and fisheries resource surveillance systems. One application of technology in

monitoring fishing vessels is a Vessel Monitoring System or VMS that can be installed and activated continuously when fishing. Based on Ministerial of Maritime Affairs and Fisheries Regulation Number 42 of 2014, Article 12, paragraph (1) and (2), Regarding Fisheries Vessel Monitoring System, stipulates that "any vessel greater than 30 gross tons operating in The Republic of Indonesia State Water Area and the high seas must install Vessels Monitoring System (VMS) transmitters. These monitoring systems can be carried out before fishing vessels starting the activities." This research aims to investigate the government's efforts in tackling the practice of illegal fishing; therefore, the use of the VMS is anticipated to be a solution in reducing IUUF violations.

Material and Method. This study employs the socio-legal research approach as it refers to a combination of research references by compiling, describing, and illustrating the legislation materials and expert opinions (Soemitro 1990; Wiratraman 2008) to obtain research results with social disciplines in a single approach (Banakar & Travers 2005). This approach was carried out by examining the legal norms in the legislation related to the responsibility of fishing vessels to function VMS and the impact of their effectiveness in reducing the number of IUUFs. Data collection was conducted through literature research. A literature study is a technique of studying books, papers, notes, and reports associated with the problem (Hadikusuma 1995; Nazir 2003). This study uses and combines primary data and secondary data. Primary data was taken by conducting in-depth interviews with work units related to VMS and fisheries actors such as ship owners and ship crews who have used transmitters on their vessels. Secondary data were obtained from primary legal materials, secondary legal materials, and tertiary legal materials (Soekanto & Mamudji 2006). The secondary data used in this study are:

- 1) Primary legal documents are binding legal materials, such as:
 - a. The 1945 Constitution of the Republic of Indonesia;
 - b. Law of the Republic of Indonesia Number 45 of 2009 concerning Amendment to Law Number 31 of 2004 concerning Fisheries;
 - c. The Republic of Indonesia Government Regulation Number 54 of 2002 concerning Business Fishery;
 - d. Regulation of the Ministry of Maritime Affairs and Fisheries Number 42 of 2014 Regarding Fisheries Vessel Monitoring System;
 - e. Provision of the Ministerial of Maritime Affairs and Fisheries Number 5 of 2008 concerning Capture Fisheries Business; and
 - f. Regulation of the Ministerial of Marine Affairs and Fisheries of the Republic of Indonesia No. 1/PERMEN-KP/2017 concerning Information on Fishing Vessel Operations.
- 2) Secondary legal materials are those that explain primary legal documents, such as References and books relating to the problem under study;
 - a. The results of scientific work; and
 - b. Reports' results of scientific research.
- 3) Tertiary legal material provides instructions and explanations for primary and secondary legal substances, such as Legal Dictionaries, The Great Dictionary of the Indonesian Language, and encyclopedias.

Results

The development of the Vessel Monitoring System (VMS). Based on the Regulation of the Ministry of Maritime Affairs and Fisheries Number 42 of 2014 Regarding Fisheries Vessel Monitoring System (VMS), VMS is one of the monitoring methods using satellites and VMS transmitters installed on fishing vessels to facilitate supervision and control of fishing vessel activities.

In Europe, VMS was first introduced for fisheries control and enforcement purposes. The use of VMS continues to grow, improve, and support the assessment of fishing activities and fisheries governance planning (Dinmore et al 2003). In Indonesia, VMS has been implemented since 2003 and has improved in several generations. The Ministry of Marine Affairs and Fisheries of the Republic of Indonesia (KKP) in Jakarta built

a Fishing Monitoring Center (FMC) to achieve the success of VMS implementation by installing VMS transmitters on several fishing vessels.

The VMS could display high-resolution data concerning the availability of fishing distribution and present vessel specifications from all fishing areas. Also, VMS is used to support law enforcement and can show the fishing location activities based on the distribution of position density and vessel records (Harrington et al 2007). Data from the VMS can also be utilized to investigate the compliance level of Indonesian fishing vessels, including fishing areas, fishing tools, fishing methods, catch landings, and other legal provisions.

According to Gallaher (2002), satellite-based VMS technology consists of three essential components (Figure 1):

1. a transmitter or transceiver mounted on a fishing vessel to indicate the position of the vessels both online and offline;
2. media or transmission system as a vehicle to transmit vessel position information from fishing vessels to Fisheries Monitoring Center (FMC); and
3. fisheries Monitoring Center (FMC) or monitoring center for receiving, storing, displaying, and distributing data.

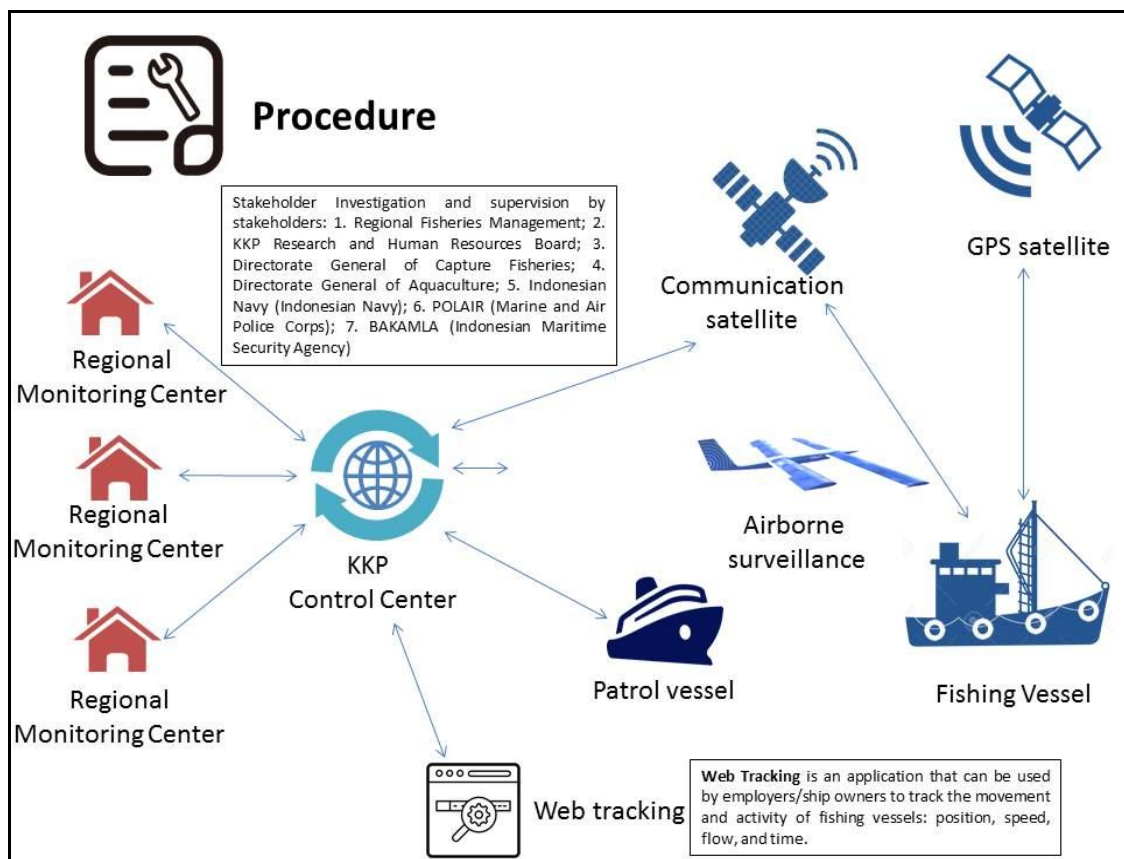


Figure 1. The procedure of VMS (Source: the Directorate of Facilities and Infrastructure Supervision 2008).

The fishing boat monitoring system has three working systems based on its roles (Hadinata 2010):

1. Installers and service providers: the provider conducts installers and service providers. Providers, as service providers, provide transmitters and satellite services in the implementation. The provider installs transmitter units on each designated vessel. However, sometimes the installation of the transmitter is carried out by the supervisor in each port;
2. Monitors: monitoring is done by supervisors or operators from FMC or VMS secretariat and supervisors at the harbor. The operator observes the movements of fishing vessels with installed transmitters from the monitor screen. The operator analyzes each vessel's

motion based on validated vessel data. In some other times, supervisors at the port are also in charge of checking the transmitters' condition placed on each fishing vessel; and 3. Actor: actors in the monitoring system of fishery vessels are the Directorate General of Supervision and Control of Marine Resources and Fisheries (P2SDKP). The Director-General of P2SDKP has the responsibility of making decisions in case violations were found. The decision is made based on reports from the results monitoring conducted by the operator at the VMS secretariat.

Fishing vessels and fishing business. Based on Article 1 number 9, Law Number 31 of 2004 Concerning Fisheries, fishing vessels are ships, boats, or other similar modes of transportation used for fishing. The intended vessels support fishing operations, fish cultivation, fish transportation, fish processing, fisheries training, and fisheries research/exploration. Article 34, paragraph (1) further explains fishing vessels based on their functions:

- a. Fishing vessel;
- b. Fish processing vessel;
- c. Fishing boat;
- d. Fishery research/exploration vessels;
- e. Vessels are supporting fishing and or fish farming operations.

Directorate General of Sea Transportation (the Ministry of Transportation) in February 2019 revealed 33,052 fishery ships that had been verified and received operational permits and 232,414 fishers who had confirmed and obtained navigator books as documents that must be kept by fishermen.

Meanwhile, the number of fishing vessels based on the Fisheries Management Area (FMA) issued by the Ministry of Marine Affairs and Fisheries of the Republic of Indonesia is indicated in Table 1.

Number of fishing vessels per FMA-NRI in 2015

Table 1

<i>Area</i>	<i>Number of vessels</i>
FMA-NRI 572	748
FMA-NRI 573	977
FMA-NRI 711	1,917
FMA-NRI 712	236
FMA-NRI 713	693
FMA-NRI 714	213
FMA-NRI 715	528
FMA-NRI 716	478
FMA-NRI 717	575
FMA-NRI 718	1,500

Source: the Directorate General of Marine Resources and Fisheries (2018).

The data from the Directorate General of Capture Fisheries above shows that capture fisheries production has increased every year. This increase was triggered by a strict policy issued by the Ministry of Marine Affairs and the Fisheries Republic of Indonesia to prevent illegal fishing by cracking down on vessels that were voluntarily stealing fish in the territory of Indonesian fisheries administration, as shown in Figure 2.

Meanwhile, the volume of capture fisheries production from 2012 to 2018 is shown in Figure 3.

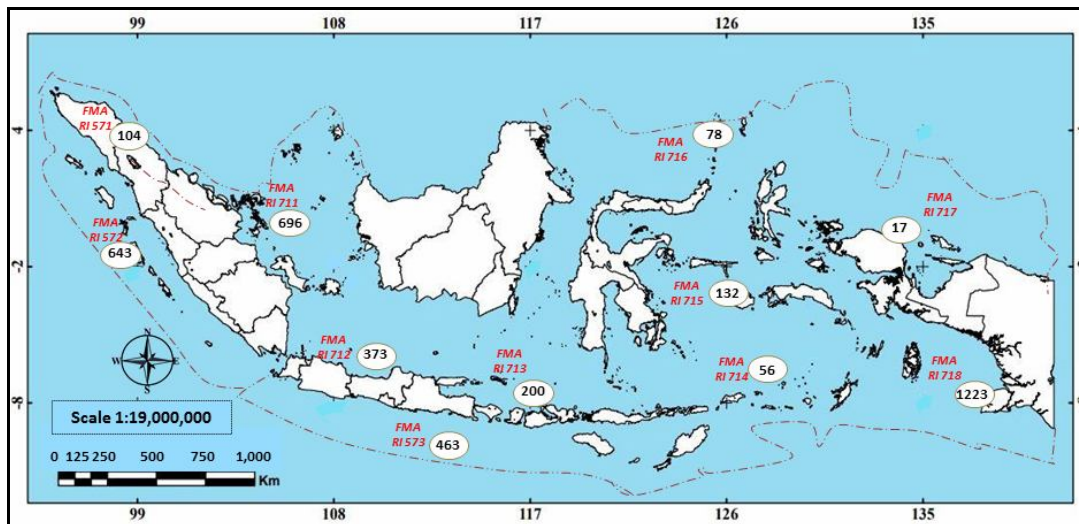


Figure 2. The distribution of fishing vessels based on fisheries management (Source: the Directorate General of Marine Resources and Fisheries 2018).

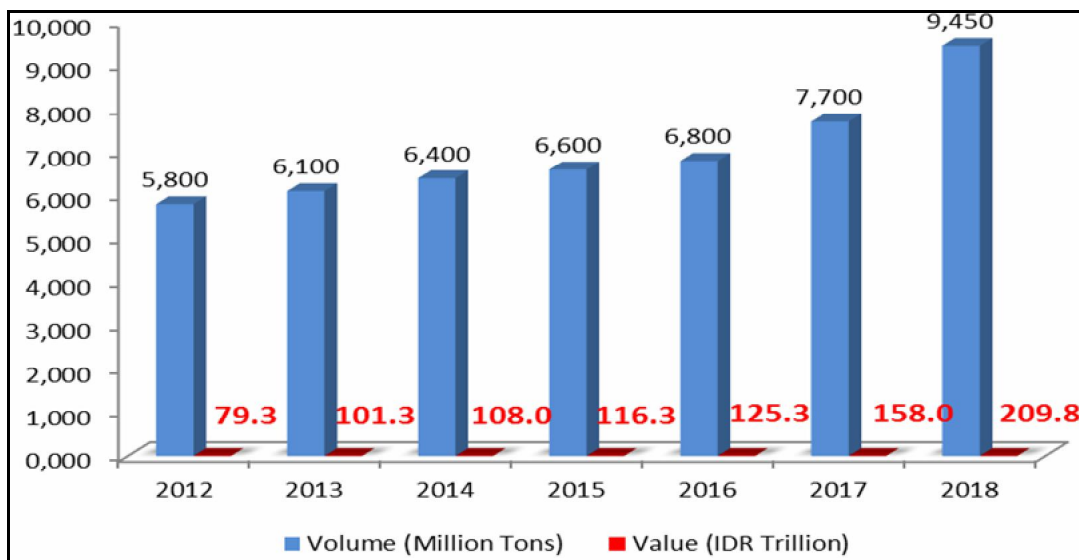


Figure 3. Capture fisheries production from 2012 to 2018 (Source: the Directorate General of Marine Resources and Fisheries 2018).

Illegal, unreported, and unregulated (IUU) fishing. IUU fishing is a harmful activity and threatens fisheries control. IUU fishing is categorized into three groups (Damanik & Prasetyamartati 2008):

- 1). Illegal fishing refers to various activities:
 - a. Conducted by local/foreign vessels under a particular jurisdiction of country/state, without permission or against laws and regulations from the related country/state;
 - b. Conducted by vessels with the flag of a member country of the relevant organization but operating against the rules of conservation and resource management adopted by that organization. The culprit is bound or against international law that is being implemented, violating national law or international obligations, including those carried out by countries that cooperate with a relevant organization.
- 2). Unreported fishing refers to fishing activities:
 - a. Not reported or misreported to the proper national authority. Contradicts with the rules and regulations; or
 - b. Conducted in areas under the competence of a regional fisheries management organization that is not reported or misreported, contrary to the reporting procedures of the organization.
- 3). Unregulated fishing refers to fishing activities:

- a. Within the area of regional management, carried out by vessels without nationality or vessels with the flag of a non-member country of such organization. Also, by a fisher entity in a way that is not consistent with or against the rules of conservation and management of the organization; or
- b. In areas of various fish stocks without conservation and management rules (actions). Hauling activities carried out inconsistently for the conservation of marine biological resources under the responsibility of international law.

The types of IUU fishing or vessels' violation (Figure 4) that frequently transpire in Indonesia include (Latar 2004): fishing without a fishing permit; the practice of fake licenses in fishing activities; not communicating the fishing results at the port; the use of prohibited fishing gear in the territorial waters of Indonesia; conduct fishing enterprises in territorial waters that are forbidden; and fishing in areas that are not following the given fishing permit.

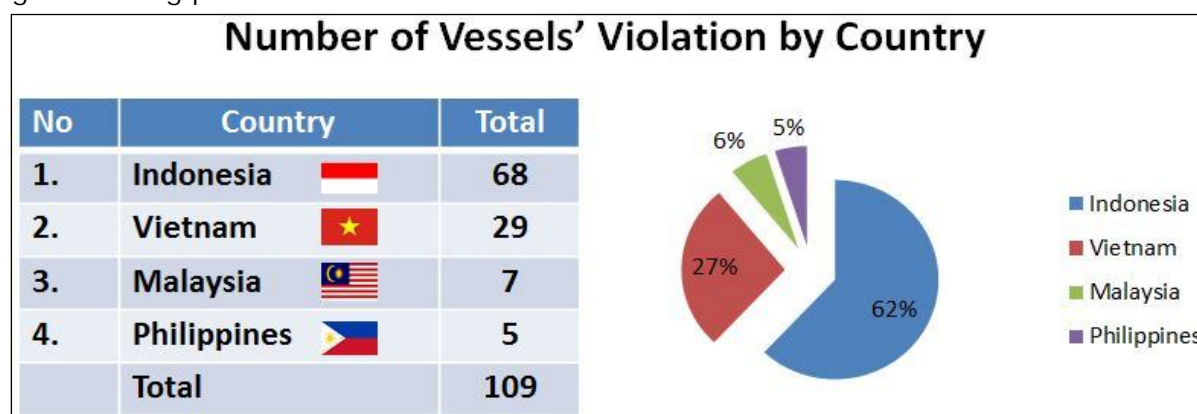


Figure 4. Violations seized by the Ministry of Marine Affairs and Fisheries of the Republic of Indonesia (Source: the Directorate General of Marine Resources and Fisheries 2017).

Data monitoring of Indonesia's fishing vessels. As stated in the previous discussion, fishing activities were supervised directly by the Directorate General of Maritime and the Fisheries Resources Supervision, the Ministry of Marine Affairs and Fisheries of the Republic of Indonesia. Based on data obtained from the Strategic Plan by the Directorate General of Marine and Fisheries Resources Surveillance in 2015-2019, the following are the results of fishing vessel monitoring related to the VMS transmitter installation from 2010 to 2014 (Table 2).

Table 2

Fishing vessels monitoring in 2010-2014

No	Year	Vessels with transmitters installed	Monitoring results	
			Fishing vessels with activated transmitters (units)	%
1	2010	3,835	2,067	53.90
2	2011	4,201	2,289	52.46
3	2012	2,800	1,571	56.12
4	2013	4,393	3,228	74.83
5	2014	4,791	4,213	87.49

Source: The Directorate General of Marine and Fisheries Resources Surveillance Strategic Plan 2015-2019.

Table 2 proves that the number of active vessels with VMS installed has increased significantly from 1,571 vessels in 2012 and became 3,228 in 2013; even more, the number is increasing every year. The targets of the Directorate General of Marine and Fisheries Resources Surveillance for the 2015-2019 periods concerning the VMS installation are shown in Table 3.

On the other hand, the Ministry of Marine Affairs and Fisheries of the Republic of Indonesia, specifically the Directorate General of Marine and the Fisheries Resources Surveillance, would face the obstacle in monitoring and prosecuting illegal, unregulated, and unreported fishing (IUUF) activities. The challenge is based on a sustainable fisheries

management strategy research carried out by the Ministry of National Development Planning (Bappenas), as shown in Table 4.

Table 3

Framework for Performance Target, the Directorate General of Maritime and Fisheries Resources Supervision in 2015-2019

Project program	Objective	Indicator	Target year				
			2015	2016	2017	2018	2019
Armada Monitoring and Operations	The monitored fishing industry segment/unit	The compliance percentage of fishing vessels towards the Fishing Vessel Monitoring System provisions	70%	80%	-	-	-

Source: The Directorate General of Marine and Fisheries Resources Surveillance Strategic Plan 2015-2019.

Table 4

Issues, difficulties, and the possible consequences on sustainability of capture fisheries (the study of sustainable fisheries management strategies, Jakarta, December 2014)

Issues	Difficulties	Potential consequences
Illegal, unregulated and unreported (IUU) fishing activities	Lack of optimal human resources in maritime law enforcement	Fish resources will encounter degradation and overfishing
	Limit empowerment on fish resource and vessel supervisory officers	The decline of foreign exchange value from the capture fisheries subsector
	Manipulation of vessels gross tonnage (GT) size	The decline in the value of Non-Tax State Revenue from the capture fisheries sub-sector

Discussion

Obligations of fishing vessels to install and activate VMS. The commitment to install a VMS transmitter is regulated in Article 12 paragraph (1) and (2), the Minister of Maritime Affairs and Fisheries Regulation Number 42 of 2015 Regarding Fisheries Vessel Monitoring System. This regulation commands that "any vessel greater than 30 gross tons operating in the Republic of Indonesia Water Region and the high seas must install a VMS transmitter before starting fishing activities."

Also, Article 22 and 24 of Ministerial Regulation Number 42 of 2015 regulates rights, obligations, and restrictions for VMS transmitter users.

Article 22:

1). VMS users are entitled to:

- a. obtain access services for their VMS on the VMS website and/or via short messages (Short Message Services Gateway);
- b. obtain information about their fishing vessel/other their legal vessel positions.

2). VMS users must:

- a. activate the VMS transmitter continuously;
- b. uphold the original SKAT (Surat Keterangan Aktivasi Transmitter) or CTA (Certificate of Transmitter Activation) at the time the fishing boat starts fishery activities.

Article 24:

1). VMS user is strongly forbidden from moving VMS transmitters to other fishing vessels;

2). VMS user who violates the provisions referred to in paragraph (1) will be subject to suitable stringent penalties as administrative sanction by the director, which includes CTA revocation.

The aforementioned legal laws could act as a durable foundation by urging fishing vessels to install and activate VMS transmitters. Should there be any deliberate violation,

sanctions apply: therefore, the ministerial regulation appears to be an instrument of law enforcement. The penalties referred, are regulated in article 23 of Ministerial Regulation Number 42 of 2015:

Article 23:

1). VMS holders who do not carry out the responsibilities as referred to in Article 22 paragraph (2) point a are subject to suitable stringent penalties as administrative sanctions:

- a. warning;
- b. CTA suspension;
- c. revocation of CTA.

2). Administrative sanctions through warning, as referred to in paragraph (1) point a, are given a maximum of 2 (two) days;

3). Administrative sanctions through suspension of CTA, as referred to in paragraph (1) point b, shall apply if the person concerned does not complete his obligations by the end of the warning period as referred to in paragraph (2);

4). Administrative sanctions in the form of CTA suspension as referred to in paragraph (3) shall be imposed for 14 (fourteen) days after the sanctions are applied;

5). Administrative sanctions, as referred to in paragraph (1) point c will be imposed within the same period as referred to in paragraph (4), and will be terminated if the CTA holder still did not complete his obligations;

6). VMS users who do not carry out the obligations referred to in Article 22 paragraph (2) point b are subject to administrative sanctions, including the CTA revocation.

In addition to the ministerial regulation regarding VMS, some other sanctions may also be imposed as referred to the ministerial regulations by the Ministry of Marine Affairs and Fisheries Republic of Indonesia Number 3/2007 concerning a continuous voyage permit. The provisions regarding sanctions include:

1). Article 8 regulates: the operational, technical feasibility requirements, including the existence and activeness of fishery monitoring equipment;

2). Article 10 regulates: fishing vessels which are not satisfying administrative requirements and technical feasibility/operational will not be granted an Operation Worthiness Certificate (OWC) or Surat Laik Operasi (SLO);

3). If those fishing vessels do not meet the criteria for WC issuance, the fishery supervisor will recommend the Harbormaster not to issue a Sailing Permit (SP) or Surat Izin Berlayar (SIB);

4). Hence, if a fishing vessel is either not well equipped with a transmitter or the transmitter is inactive/cannot be monitored by the monitoring center, the OWC still cannot be issued.

The application of VMS in fisheries business practices. The application of VMS can be perceived from several viewpoints, by the government and the angling community. For fishers, VMS is costly to purchase. The price of one VMS unit ranges from IDR 20 to 30 million. Let alone the administration and maintenance expenses that need to be spent every year, ranging from IDR 6 to 8 million per year. These costs will also be accumulated to the fixed costs and operational costs. If all fees are put together, both local fishermen and business owners in related fields would be very reluctant to pay.

Apart from the purchasing and airtime costs, these costs will rise if there was damage to the transmitter. The responsibility of any mishap goes to the ship owners; transmitter damage must be repaired immediately by the provider, and the ship owners will undoubtedly bear the cost. The fee for the technician is around IDR 1.5 million for each technical/nontechnical treatment. These costs do not include components that must be replaced if any part is either broken or unfixed. Every VMS purchase does not come with a warranty, and in case the transmitter cannot be repaired, the replacement shall prevail. Such circumstances lead the ship owners to spend much more additional costs if the devices are in trouble.

In terms of data usage, data output from VMS has several limitations when operators want to use them for research and monitoring of fishery activities. These limitations constitute incomplete coverage of vessel activities, long periods between

vessel positions, reported records, and lack of information about the real event (be it on catching/standby) when the vessel's position was being tracked (Lee et al 2010).

Many damages were found by the transmitter by fisheries supervisors at the port. The loss is either prompted by force majeure or vessel conditions incompatible. Moreover, inactive transmitters are often assumed as voluntary acts by the captain while voyaging, yet not all situations are done intentionally.

Another quite common disadvantage is when the ship owners intentionally moved the transmitter to another vessel to avoid monitoring; therefore, an improvement in the installation procedure by the provider to prevent any chance when devices being transferable quickly is highly needed. Signal transmission by VMS is still not optimal in certain areas. While monitoring, the transmitter sometimes cannot be detected at the fishing vessel monitoring center if the satellite coverage area cannot reach the VMS trajectory zone. If such an incident occurs, it will undoubtedly hamper the vessel supervision process.

The fishing vessel monitoring process at the Fishing Vessel Monitoring Center is also considered to have various weaknesses. The supervision of fishing vessels is only watched out by ten operators divided based on numerous fishing apparatus. The number of operators is thought to be very lacking in terms of effectiveness. In 2007 alone, the number of fishing vessels that had installed transmitters reached 729 units (Burhani 2007).

Considering that the number is quite high and keeps growing, each supervisor must manage around 290 units. Therefore, daily monitoring of fishing vessels seems to be non-optimal (Hadinata 2010).

Real facts reveal that violations are often inevitable even though a transmitter has been installed on the vessels. Since the supervision only focuses on the vessel's movement patterns and position, there are still many loopholes for fishers practicing violations: deactivating the transmitter and transferring the transmitter to a different vessel.

Despite that VMS lack-practice, the supervision and monitoring of fishing vessels are seemingly exposing positive effects. The application of VMS can significantly reduce crimes in fisheries facet, such as the IUUF. The following data shows types of criminal behaviors committed by fishing vessels from 2004 to 2008 (Table 5).

Table 5

Types of criminal behaviors committed by fishing vessels

<i>Type of violation</i>	<i>2004</i>	<i>2005</i>	<i>2006</i>	<i>2007</i>	<i>2008</i>
Vessel without legal registration	53	26	29	48	25
Fishing with prohibited gear	70	36	19	3	2
Vessels without registration and proper gears	9	37	33	25	-
Fake registration documents	2	-	-	-	-
Incomplete paperwork	-	-	-	15	22
Electrical fishing	1	1	34	-	-
Blast fishing or dynamite fishing	9	9	2	1	-
Fishing ground	7	24	8	9	7
Fishing ground and prohibited gear	14	18	1	1	2
Unlawful fish transportation	5	11	6	2	-
Fish transshipment without proper Fish-Transportation Vessel License	4	1	-	-	-
Type of crime without a clear statutory definition	-	2	-	-	3
Transshipment and prohibited gear	-	-	5	-	-
Vessels without transmitters	-	-	-	4	6
Coral reef poachers	-	-	2	1	-
Fishing gears without legal registration	-	-	-	7	10
Total	174	165	139	116	77

Source: Unreported and Unregulated (IUU) Fishing, the Ministry of Marine Affairs and Fisheries 2006.

Based on the above data, it appears that the number of violations has significantly reduced. Therefore, the application of VMS can effectively decrease the crime statistics of IUUF in Indonesia.

Conclusions. Technology has indeed brought various outcomes toward multiple aspects of life. Administration on the VMS technology requires fishers to maintain and activate the device to ease the monitoring of fishing vessels; this responsibility is explicitly set in Article 12 paragraph (1) and (2) Regulation of the Ministry of Maritime Affairs and Fisheries Number 42 of 2014. The regulation stipulates that "any vessel greater than 30 gross tons operating in the water area of Indonesia and the high seas must install Vessel Monitoring System (VMS) transmitters. These monitoring systems must be activated before fishing vessels starting fishing activities." VMS is expected to help the government monitor all patterns of vessel movement through the FMC (Fisheries Monitoring Center). This requirement is foreseen to press down the IUUF crime. Despite some weaknesses on the VMS application practically, VMS proves considerably useful results in minimizing the number of violations.

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