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Responses of Indonesian tuna processing companies to enhanced public and private traceability

Mandy Doddema [a,*], Gert Spaargaren [a], Budy Wiryawan [b], Simon R. Bush [a]

[a] Environmental Policy Group, Wageningen University and Research, P.O. Box 8130, 6700 EW, Wageningen, the Netherlands
[b] Department of Marine Fisheries, Faculty of Fisheries and Marine Science, Bogor Agricultural University, Jalan Agatis Campus Darmaga, Bogor, Indonesia

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ABSTRACT

Seafood is increasingly subject to traceability requirements set by importing countries and global buyers. These demands place significant pressure on value chain actors to change seafood production and trade practices to align to the standardized norms around legality and food safety. While processing companies are recognized as critical players in facilitating access to global markets there is currently a lack of understanding about how they respond to traceability demands. To address this gap, this paper employs a social practices perspective to analyse how and why the actual practices performed by tuna processing companies in Indonesia change in response to BRC certification and the EU IUU regulation catch certification requirements. The results demonstrate that responses are determined by the performance and embeddedness of existing social practices that make up tuna value chains. Furthermore, our findings showcase short term adaptive responses for practices within the direct control of processing companies while practices beyond the control of processing companies, for example those performed by middlemen and government officials, were more rigid and required new social and material arrangements to be developed. With traceability demands likely to expand, conceptualizing value chains as sets of interrelated social practices offers a novel way to understand the uptake of traceability demands.

1. Introduction

Government agencies, NGOs and retailers in the EU and the USA demand increasing levels of information to assure that seafood products are caught and handled in line with global norms around food safety, quality, legality and sustainability [1–3]. Imports are increasingly subject to private food safety standards, such as British Retail Consortium (BRC) certification [4], and public regulation such as Council Regulation (EC) No. 1005/2008 'establishing a Community system to prevent, deter and eliminate illegal, unreported and unregulated fishing (referred to hereafter as the EU IUU regulation) [5]. To meet these information demands, and maintain access to major export markets, suppliers in exporting countries are forced to collect, collate and share information about the conduct and performance of fishery production, processing and trade [6,7].

Demands for supplier information are based on assumptions that buyers are able to coordinate value chains such that standardized product specifications guide and incentivise upstream actors to 'upgrade' their practices [8,9]. Most research on (sea)food has focused on the role of retailers in setting product specifications and shaping producer practices [see 3]. At the same time, mid-value chain companies like processors, exporters and wholesalers are recognized as playing an important intermediary role in receiving, translating and coordinating the information demands from importing countries [10–15]. However, there remains limited understanding of the actual practices they perform, and on the kind of consequences their practices have for downstream product specifications and for upstream fishing- and trade related practices [16].

Research on the role of processors largely focuses on the institutional challenges brought by new international standards and regulation, on the design and implementation of information systems and on the economics of (non)compliance [e.g. 17, 18, 19]. While insightful in their own right, these studies do not clearly illustrate how the actual practices performed by processing companies change in response to international demands, how new information demands for processors impact on their relations with suppliers, nor how suppliers are expected to alter existing everyday routines of catching, landing, and trading fish [for notable exceptions see 12, 20]. In short, we know little about how processors reflexively translate demands for 'knowing more about fish production and trade in international markets' into a series of actual changes they

* Corresponding author.
E-mail address: mandy.doddema@wur.nl (M. Doddema).

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are expected to make happen in the social practices of themselves and others [21].

In this paper we open the 'black box' of processors by exploring how export oriented tuna processors in Indonesia translate transparency demands into norms, rules and resources that are needed to (re)organise the flows of fish and fish-related information running between the processors themselves, fishers, middlemen and government officials. Indonesia is a large tuna producer and exporter, making its processing industry a prime candidate to investigate how they translate the two main demands from international markets, namely BRC certification and catch certification requirements of the EU IUU regulation [22–24]. Building on Bush and Oosterveer [3] and Spaargaren, Weenink and Lamers [25], we do this by bringing to light, locally embedded social practices [6,26,27] and the ways in which they amplify, distort or frustrate the application of new market requirements [27,28]. Reflecting on our empirical results we discuss the added value of a social practices perspective for understanding when, how and why transparency demands become accepted, negotiated or rejected by different groups of actors in global seafood trade.

The paper is organised as follows. The next section outlines the social practices perspective used to investigate responses to market demands for transparency. In section three we outline the study design and data collection methods and in section four we provide further background on BRC certification and the EU IUU Regulation. Section five describes the empirical results and in section six we reflect on how the organisation of value chains are affected by processors in response to increasing public and private demands for transparency.

2. Social practices intervention framework

To comply with traceability requirements processors are required to make changes to how they source fish [29–31], process fish e.g. icing, loining, recording, labelling [see 32] and the materials through which information on fish is recorded and attached to fish products (e.g. notebooks, tags and labels). Together the actors, products, processes and materials combine to form shared and routinized 'ways of doing and saying' related to traceability called social practices [25,26,33].

Social practices in the context of this study are analysed within the locally embedded nodes of value chains that are in the process of being re-constituted in order to meet new traceability requirements. By analysing the kind of changes to the social practices, as performed by processors, that constitute traceability, we are able to identify the kinds of 'behavioural changes' that result from emerging demands for transparency in global seafood value chains [following 34].

Theories of social practices differ from other behavioural theories by focusing on how shared and routinized practices are performed by groups of social actors in specified contexts. This social and contextual approach differs from more individualist approaches which look into the conscious choices, attitudes or willingness to change from the side of individual actors [35]. Social practices in fish value chains, such as catching landing and trading fish, are seen as deliberate but routinized, taken for granted series of social doings and sayings performed by actors which always combine social norms, rules and goal achievement with the skilled handling of interrelated technologies.

Following Doddema et al. [36] we organise our research on social practices by answering two basic questions.

First, we investigate how social practices that are targeted by interventions like traceability undergo changes in terms of the ways in which they are performed by groups of social actors. What is done differently after the intervention and how acceptable, difficult or easy to realize did the new performances turn out to be?

When examining changes to the performance of social practices we look at one or more of the following five interrelated practice elements: (1) the written or unwritten *rules and norms* that belong to the practice, (2) the *meanings* or general understandings on what the practice is about, (3) the *competences* needed to perform the practice, (4) the *material* objects and infrastructures that co-constitute the practice, and (5) the *goals* that give direction to the behaviour of the practitioners; as they are drawn upon in the act of doing the practice [13,25,26,37].

When actors like processors are faced with an intervention like traceability we assess changes in how these five elements change in response. The combined effect reflects the extent to which the intervention was taken up or rejected. For example, demands for landing documentation may require new competences by fishers and government officials to record catch information and to use new (digital) technologies for collecting, collating and communicating the required information.

Second, we explore how traceability interventions change the ways in which different social practices (directly or indirectly targeted) are embedded in a wider configuration of practices. What impact does the new information system related to traceability in the processing industry have on, for instance, social practices of catching and landing fish?

Specifically, we analyse how changes in processing practices in response to traceability demands are situated in wider configurations of practices that make up tuna value chains. We analyse this embeddedness by describing the linkages between practices, taking into consideration the number of elements involved, the spatial proximity of the practices, and the (non) correspondence between their everyday 'rhythms' – when, where and by whom they are routinely performed [26,27,38]. We explore how and when new elements or new social practices are introduced as a result of traceability interventions, and how linkages, goals or rhythms between existing practices are broken, strengthened or transformed [36].

Studying the impact of an intervention from the perspective of embeddedness also means looking into how the intervention affects the longer term, institutionalized relationships between the sets of social practices that make up the value chain. Meeting export documentation requirements, for instance, might not only bring changes in gathering, storing, and transmitting information by processing companies but also in the ways these companies manage to organise trust in this information from the side of government staff and certifying bodies or in the education and training programs for staff in the processing factory.

Combining an analysis of the changing performance and embeddedness of social practices, we assess and characterize the 'response dynamics' generated by interventions like traceability, see Fig. 1. Response dynamics are not restricted to individuals accepting or not accepting social or technological innovations brought along by the intervention. Instead, they cover changes to routinized social practices brought about by the introduction of new protocols, technologies and behavioural routines. These changes represent temporary changes to existing ways of doing in a longer term process of transforming systems (like tuna value chains) towards something new (the adoption of transparent processing practices).

The approach, as such, allows us to identify and understand these changes as the temporary *de-routinization* of existing social practices followed by a *re-routinization* into new practices. It is in these moments of de- and re-routinization that social practices which are normally taken for granted by all groups of actors involved, are made the subject of debate, reflection, reconsideration and also conflicts amongst participants to social practices. These de- and re-routinisations can, for example, be observed as resistance to (and eventual adoption of) new traceability technologies. De- and re-routinization can also go along with the contestation, adaption and eventual adoption of rules and norms that shape transparency demands. By exploring what happens in these moments of de- and re-routinization we are able to observe the reconfiguration of tuna value chains under the influence of transparency (policies).

To cover both the short term and longer term changes in the value chain, research on response dynamics benefits from combining static and processual analyses of the everyday practices of key actors like middlemen, fishers, retailers or processing companies. In the next section we discuss these methodological aspects in more detail.

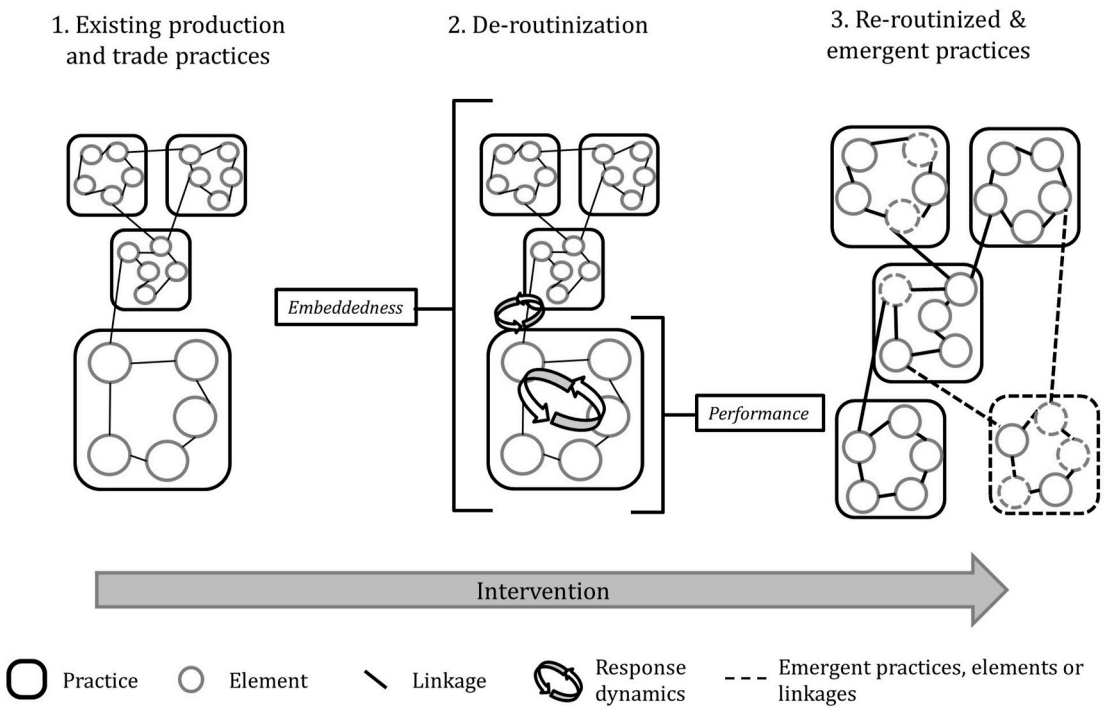

Fig. 1. Social practices intervention framework. The figure showcases the conceptual model, inspired by practice theory [25–27] that is used to study responses to interventions. The figure depicts the three analytical steps of the framework: the existing sets of practices, the deroutinisation resulting from the intervention and the re-routinization of existing sets of practices and the emergence of new practices. In each step, both the performance i.e. the active integration of practice elements as well as the embeddedness i.e. the linkages between sets of practices are explored.

3. Methods

The changing performance and embeddedness of practices performed by Indonesian tuna processors in response to traceability demands were assessed through a qualitative research design. To showcase the added value of employing a social practice lens, we develop contextual descriptions of the practices performed by Indonesian tuna processors and assess their responses to BRC and EU IUU regulation traceability demands in three ports in Indonesia.

Data collection was conducted in Archipelagic Fishing Port of Ambon, Oceanic Fishing Port of Bitung and Nizam Zachman Oceanic Fishing Port of Jakarta, Indonesia between February and May 2017. Following Nicolini [39], data was collected by switching between 'zooming in' on the detailed performance of practices and 'zooming out' to observe the wider embeddedness of those practices in larger networks of practices. This was completed in two steps.

In step one, a detailed understanding of practices within one tuna processing company was developed based on participant observation over a period of two weeks and interviews with 11 staff members working in a variety of sub-departments of the company. The data and observations collected enabled (1) the identification of a series of routinized practices deemed to be of relevance to the interventions and a description of their performance, (2) the specification of where, how and when interventions led to a de- and re-routinization of these practices and their participants, and (3) a description of the connections between in-house processing practices and other social practices within and beyond the factory that may have been affected by the two interventions.

In step two, in-depth, semi-structured interviews were conducted with either the general manager (in some cases the owner) or the head of the Quality Control team of 15 tuna processing companies. The companies were identified via snowball sampling, with the criteria that they process at least one species of tuna and are engaged with BRC and/or the EU IUU regulation. This additional data was collected to understand how the performance and embeddedness of the sets of practices performed by these 15 companies within and beyond the factory vary or are similar to those identified in step one.

In addition to the data collected from processing companies, interviews with fishers and middlemen linked to a few of these processing companies were carried out between October 2016 and May 2017. For these actors operating at landing sites beyond the factories, relevant social practices were identified and their performances described with the help of the methods mentioned above for the two steps.

All interviews and observation notes were categorised and coded using ATLAS.ti software. The codes used (following Fig. 1) correspond directly to the interventions (EU IUU regulation and BRC certification), identified practices, changes in performance of these practices and the changes in their embeddedness in response to the interventions.

4. Seafood processing companies and market demands for food safety and legality

The BRC Global Standard for Food Safety and the catch certification requirements of the EU IUU regulation require considerable engagement of processors. In the following paragraphs we outline the goals and requirements of both regulatory interventions, as well as the practices they target.

BRC is a trade association for the UK food retail industry that uses its Global Food Standard as a means of what they term "total quality management" [4]. In contrast to more general quality systems used in processing facilities, like Hazard Analysis Critical Control Point (HACCP), BRC extends beyond processing to include all upstream nodes in supply chains beyond the factory. To be in compliance with BRC, processors must have or put in place senior management commitment, a food safety plan (HACCP), a food safety and quality management system, site (factory) standards, product control, process control, personnel training and rules, rules for high risk production zones, and requirements for traded products [for detail see 4]. To limit our focus, and to ensure comparability with the EU IUU regulation, we focus our attention to requirements that fall under the food safety and quality

management system particularly the implementation traceability in processing facilities and practices on the one hand, and on practices of getting supplier approval and the monitoring of fish flows on the other.

The EU IUU regulation, which came into effect in 2010, requires all imports of seafood into the EU market to be accompanied with a catch certificate issued by a competent authority in an exporting country indicating that the product is legal, reported and regulated [2,40]. In Indonesia, the Ministry of Marine Affairs and Fisheries (MMAF) Regulation No.13/2012 sets out a two-step procedure through which catch certificates (or *Sertifikasi Hasil Tangkapan Ikan* - SHTI) can be obtained for seafood that is destined for the EU. Following a fishing trip a vessel captain has to submit several documents - a copy of the applicant's identity, the vessel's fishing licence, the vessel arrival report and the verification report of fishing landing (LHVPI) - to the local competent authority to obtain a SHTI 'First Sheet'. If fish is landed in a landing site that does not have a local competent authority, the vessel captain has to instead obtain a certificate of fish landing (or *Surat Keterangan Pedaratan Ikan* - SKPI) from the head of the fishing port or the relevant appointed official in that landing site. Subsequently, the processing company has to submit the SHTI First Sheet or the SKPI to the local competent authority who respectively issues the SHTI 'Derivative Sheet' or SHTI 'Simplified Derivative Sheet' and a SHTI 'Import Sheet', both of which accompany the shipment of tuna to the EU.

Both the BRC standard and Indonesian MMAF regulation specify new responsibilities for processing companies. However, neither prescribe how processing companies should organise their compliance, including changes to the practices (when and how) of staff members. Nevertheless, as summarised in Table 1, a number of existing practices performed by processing company staff are affected by the traceability requirements of BRC and the catch certificate requirements of the EU IUU regulation. For example, both market demands affect how data is collected by staff working at landing sites as well as post-capture handling practices performed by fishers and middlemen in these landing sites.

Table 1
Overview of market demands, interventions and targeted practices.

Market demands	Interventions	**Existing social practices performed by processing company staff**		
		1.Data collection and analysis performed by production data collection staff in the factory	2. Sourcing fish from suppliers performed by procurement staff in landing sites	3. Obtaining export permits performed by export staff in government offices in ports
BRC	A. Ensuring traceability of all seafood product lots	X		
EU IUU	B. Conducting supplier audits		X	
	C. Receiving SKPI or SHTI-First sheet from suppliers		X	
	D. Obtaining SHTI (Simplified) Derivative and Import sheet from port authority			X

5. Responses to traceability demands

This section takes the three sets of social practices shown in Table 1 as a starting point to describe the processes of de- and re-routinization ensuing from BRC certification and/or the EU IUU regulation. For each set of social practices, the existing practices, the intervention and responses are outlined.

5.1. Social practices of data collection and analysis performed by staff in processing factories

Requirement 3.9 in the BRC Global Standard for Food Safety states that processing companies "shall be able to trace all raw material product lots (including primary packaging) from its suppliers through all stages of processing and dispatch to its customers and vice versa" [4, p. 31]. The central challenge related to this requirement is to arrange product sourcing in such a way that 'production lots' – a unit of fish with an allocated lot number that undergoes processing - can be traced back to a specific supplier – often a fisher, middleman or trader. Ensuring that production lots can be traced back to a specific supplier affects existing practices of data collection on product transformation by processors within factories when sorting, grading, cleaning, pre-cooking, treating, cutting or packing tuna. Each of these practices is performed at different station in the production line, alongside quality control sampling and paper based data collection on processed volumes during each production shift.

The extent to which practices are de- and re-routinized to accommodate the BRC requirements depends on whether suppliers are or are not already systematically identified and attached to production lots. Respondents indicate that the definition of production lots varies substantially. A production lot can refer to a single fish, to all the fish supplied by a specific supplier on a specific date, or all the fish processed in the production line on a day. If data collection already distinguishes between fish sourced from different suppliers, no changes are needed to the existing ways of recording and attaching information to production lots in order to comply with the BRC requirements. But if no distinction is made between suppliers, then significant changes to the social and material organisation of the processing line are needed.

Such a reorganization has considerable impact on how and when tuna are processed in factories. For example, when fish from multiple suppliers arrive at a factory for processing on the same day, the BRC requirements to preserve the identity of suppliers means that all fish supplied by one supplier is processed and stored separately – rather than mixed together and reported in aggregate. While physical separation and identity preservation practices ensure that the tuna remains traceable back to suppliers it also causes delays because production lines have to wait for all fish from a single supplier to pass through the line. This is in the end less efficient than indiscriminately mixing fish from different suppliers during the processing. Besides separating the fish from different suppliers, new data forms are introduced at each station to be able to track the product lots per supplier. This initially slows the data collection as staff develop the competences and adjusts to the use the new forms in the fast paced production line setting.

Not all of the BRC requirements lead to disruptive changes and less efficient rhythms of processing. In some instances, new requirements can be integrated into existing practices. For example, BRC requires mass balance calculations of a product-to-waste ratio of the fish entering the factory (e.g. whole fish) compared to the fish exiting the factory (e.g. loins, steaks, cans) with the goal of minimizing waste. While the collection of this data is done by staff during production shifts, the analysis and reporting of this data is commonly integrated into existing Excel-based data systems in the factory office, performed by the same staff that collects the data on the factory floor. The main change is that these mass-balance calculations are done more frequently than before the introduction of the BRC certification.

Despite the additional workload, most respondents see the added

value of mass-balance calculations and production lot separation. As one owner of a processing company argued when explaining the introduction of these measures, "knowing our yield losses between raw material and finished goods is important from a business perspective as differences in yield make a huge difference on your revenues". This indicates that despite the additional work, the processing, data collection and data analysis practices associated with mass-balance and identity preservation align well with wider commercial goals. For example, having finer resolution data on production lots and the overall volumes passing through the factory enhances the ability of processors to more precisely implement recalls following discovery of safety issues (such as high levels of histamines – see [41] or product defects (e.g. discolouration, freshness, consistency of meat or fouling)). As clearly outlined by another respondent, "If I buy 2 tons fish on a given day and a problem is found with fish sourced from a supplier who only sold me 100 kg, if I didn't have good traceability I would have recall all the fish from that day which would mean that I have a lot of financial losses". This means that fish supplied by only this one supplier has to be recalled, which in turn leads to less disturbance to ongoing fish processing and lower overall cost.

Overall, these findings indicate that BRC requirements, while de- and re-routinizing processing practices through the introduction of new tasks and changing rhythms, are in fact well aligned to the materials (e.g. the data attached to fish or forms used for data collection), competences (e.g. data collection and analysis) and goals (e.g. minimizing waste and maximizing revenues) that comprise the existing performances of processing and data collection practices within processing factories (see Fig. 2). It appears that the BRC standard is designed to align goals for traceability to existing business goals, including reducing yield losses and minimizing the cost of product recall volumes. As we now go on to present, alignments are less easy to establish when processors are tasked with organising traceability in sites and with actors outside of their own factories.

5.2. *Social practices of sourcing fish from fishers or middlemen performed by procurement staff in fish landing sites*

Processing companies are held responsible for compliance to BRC certification and the EU IUU regulation catch certificate requirements. However, the changes in practices needed for compliance are not entirely under the control of the processors themselves. In many cases, compliance relies on the de- and re-routinization of social practices that are performed by fishers or middlemen in landing sites. The following outlines how processing company staff engage with these outside factory practices and their actors in their attempts to conform to export market requirements.

5.2.1. *Obtaining SKPI or SHTI – First Sheets*

The practices of processing companies selling to the EU market were affected by the introduction of the EU IUU regulation. In some instances processors with buyers in non-EU markets elected to phase out sales to the EU because these new rules and procedures were deemed too strict. In other cases, processing companies adopt a flexible approach based on the competences of their suppliers to meet the SHTI requirements. If their suppliers can meet their demand to provide an SKPI or SHTI-First Sheet they will sell to the EU. But if the tuna arrives in the factory without either of these documents they still accept the tuna and sell it to non-EU markets.

When a processor has a major client from the EU, however, flexible sourcing becomes problematic because it does not guarantee enough compliant sourced tuna due to the poor awareness of the official requirements and the volumes of the orders placed. In these circumstances processors are forced to confer transparency demands via sourcing practices on the basis of competitive sourcing. However this poses challenges too, as illustrated by the following respondent, "If there is no catch certificate then I don't buy the fish, but other companies do and they offer the same price. This makes it difficult to get raw material as suppliers are also more likely to sell the tuna to these other buyers". Offering higher prices is, as such, not enough for procurement staff to

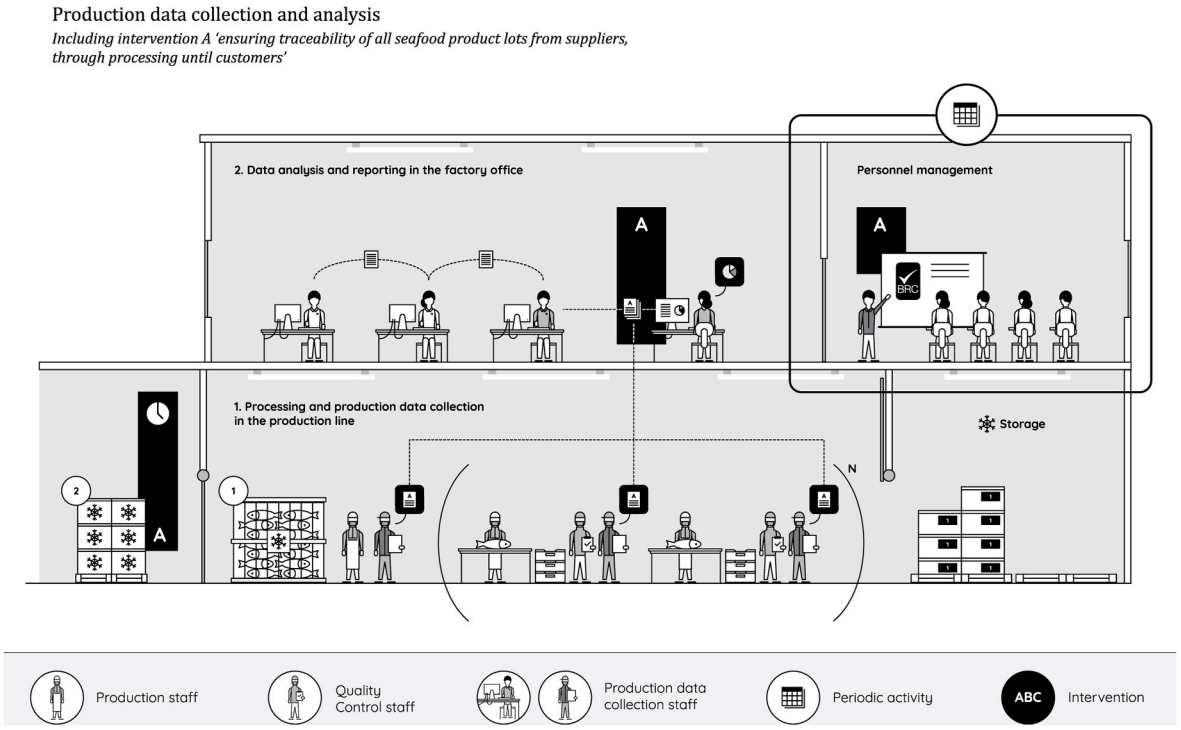

Fig. 2. Practices organising flow of tuna and information in the processing factory as (co)performed by production data collection staff. The image depicts the sets of practices performed by processing company staff within the processing factory that are implicated by BRC requirements that all seafood product lots are traceable from suppliers, through processing until customers (intervention A). The intervention is shown in black boxes.

obtain the necessary permits.

In order to ensure that suppliers provide the required documentation, processors have instead adopted relational sourcing practices which involves developing long-term and trust-based interactions with their suppliers and their direct presence and in various landing sites. This in turn enables them to more effectively convey the demands for the SKPI or SHTI–First Sheets.

The degree of involvement of processors in these landing sites also depends on how well established practices of obtaining fishing permits are. These practices are, for instance, prevalent in ports throughout Indonesia where vessels larger than 10 GT land. Here fishers or middlemen are well accustomed to obtaining fishing licenses, sailing permits and submitting fishing logbooks to government officials. In these landing sites the introduction of SKPI or SHTI- First Sheets as an additional material organised via similar rules as the existing practices of obtaining fishing permits entails no major changes to the status quo. As one respondent indicated, "it is not difficult to get the catch certificate because all the vessels are registered, have necessary documentation and land at the port".

In remote landing sites where vessels are smaller than 10 GT land that are not subject to government permits and licencing, the demands for SKPI permits from processors does require major changes to the existing routinized practices of fishers, middlemen and local government officials. With few exceptions the adoption of obtaining SKPI practices is not widely taken up. Most processing companies indicate that government officials are not aware of their regulatory responsibilities, even though local government officials in remote fishing communities are formally authorised to issue the SKPI. Furthermore, existing daily routines of fishers and middlemen did not align to this new practice. As one processing company explained, "when fishers land, they

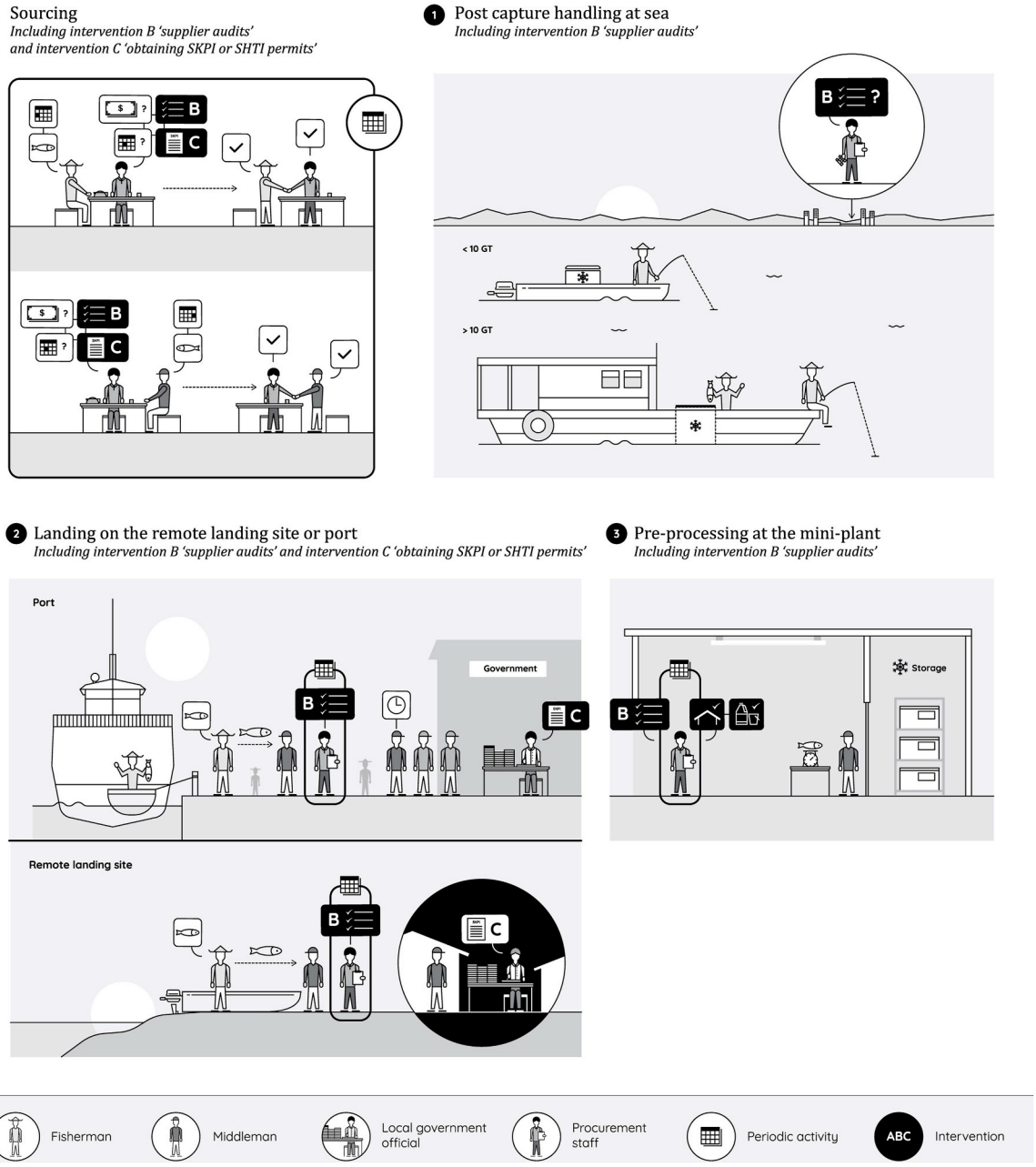

Fig. 3. Practices organising flow of tuna and information in landing sites as (co-) performed by procurement staff. The image depicts periodic as well as daily sequential sets of practices within fish landing sites that are implicated by both BRC requirements that processors audit their suppliers (intervention B) and EU IUU regulation requirements that processors obtain SKPI or SHTI permits from their suppliers (intervention C). The two interventions are shown in the black boxes.

want to sell their fish as soon as possible as they are tired and if you are telling them that there is a specific place and time you have to be to get the SKPI, then it is not realistic". Another respondent indicated that, "I have a commitment from my middlemen that all fish should be accompanied by SKPI, but they sometimes do not provide the permits because it takes substantial effort and they are more focused on making profit quickly".

As visualised in step 2 in Fig. 3, where there is an established practice of obtaining permits after the fish is landed, the SKPI and SHTI-First Sheet permits are but one additional permit that have to be organised as part of the established routines and are thus incorporated relatively easily. However, where there is no established permit-related routine, obtaining the SKPI and SHTI-First Sheet is an emergent practice that tends not to align with the existing practices of fishers, middlemen and local government officials. In response, procurement staff from processing companies engage directly in landing sites by either increasing the frequency of their visits, or establishing a presence in the landing site on a more permanent basis. In doing so they seek to coordinate the practices of fishers, middlemen and government staff to deliver the required documents which in turn enable them to comply with the EU IUU requirements.

5.2.2. Auditing suppliers for BRC

BRC requirement 3.5. states that "the company shall have an effective supplier approval and monitoring system to ensure that any potential risks from raw materials to the safety, authenticity, legality and quality of the final product are understood and managed" [4, p. 20]. As such, BRC requirements prescribe that supplier auditing is introduced alongside the practice of sourcing to ensure that suppliers effectively manage risks to tuna quality and safety. This in turn means that processors are again required to extend the scope of BRC requirements beyond the processing factory to landing sites.

The existing practices of sourcing fish entail making agreements about the quality and form (whole or loined/dirty or cleaned) of tuna delivered to the processing factory. However, in order to meet the BRC requirements, processors have put in place supplier audits, involving quality control by procurement staff during visits to landing sites. These visits are designed to check supplier facilities and determine the level of risk of not meeting product safety, legality and quality requirements. On the basis of these visits the procurement staff suggest improvements on how the flow of product is organised and specify that quality and safety norms are pre-conditions for future sourcing from the supplier. Processing companies indicate that they stop sourcing with non-compliant suppliers but this may in fact create trade-offs as it can undermine their ability to source sufficient volumes of tuna.

The introduction of supplier audits also affects existing practices beyond the direct control of processing companies, such as post-capture handling and pre-processing.

Post-capture handling is performed by fishers once tuna is caught at sea. While this practice can vary substantially, it generally entails cleaning and storing tuna to preserve quality until the vessel arrives back at the landing site. Supplier audits occur when vessels return to the landing site or port however how fishers handle tuna at sea is difficult to control by processing companies. One quality control officer stated, "the fishers have been fishing since they are young so it is quite difficult to change what they do on a fishing trip".

Pre-processing is performed by middlemen or traders in mini-plants and focus on checking, grading and storing tuna in a freezer until there is enough volume to send a shipment to the processing company. The introduction of supplier audits means that quality control staff and procurement staff visit the mini-plant to evaluate how middlemen handle the tuna. While some middlemen refuse to make changes to the practice of pre-processing, other middlemen are open to supplier audits. As one middleman stated, "based on a suggestion from the processing company we built a new mini-plant that reduces the risk of infections from outside pests and viruses transmitted via flies".

The continual challenge for processing companies is how to intervene in post-capture and pre-processing practices through audits in a way that they remain BRC compliant while also ensuring that they maintain supplier loyalty. Contrary to the assumption that certification and auditing enables arms-length control over food safety and quality, the processing companies scale up their presence in landing sites to intervene directly in the materials (e.g. storage boxes, disinfectant) and competences (e.g. cleaning, icing) of both post-capture handling and pre-processing (see step 1 and 3 in Fig. 3). This goes so far, in some cases, as taking control over quality by building their own mini-plants at every landing site where they buy tuna.

5.3. Social practices of obtaining export permits performed by export staff in ports

The introduction of the EU IUU regulation not only affects the social practices of sourcing in landing sites but also the practices organising exports in ports where processing factories are located. Meeting these requirements requires changes to the obtaining export document practices performed by government officials and export staff employed by processing companies selling to the EU.

In order to export a shipment of tuna to the EU, an 'SHTI-(Simplified) Derivative Sheet' and an 'SHTI-Import sheet' have to be obtained from the local competent authority. To obtain these documents processing companies have to submit the SKPI or SHTI-First Sheets provided by their suppliers, as well as a variety of existing permits such as the certificate of origin (SKA) from the regency or port where the fish was landed, a health certificate from the quarantine department after testing a sample of the fish being shipped, and a fish distribution certificate issued by the fisheries supervisory unit of the Directorate General of Marine and Fisheries Resources Surveillance (PSDKP).

Obtaining the SHTI permits to organise exports to the EU does not require a substantial change in the practice of the export staff employed by processing companies given that no additional competences are needed to navigate port bureaucracy and only one additional office has to be visited by to obtain the permits. However, the issuance of both of these new documents does require substantial changes to the practices of government staff.

The responsibility of issuing of the SHTI-(Simplified) Derivative and Import Sheet lies with the port authority who is often designated as local comptenten authority. Besides being responsible for issuing these permits the port authority issues a variety of documents to authorise every fishing trip made out of their port. As a result there are considerable waiting times for export staff, vessel captains and middlemen who come to the port authority office to submit and pick up documents. Given that the SHTI-(Simplified) Derivative and Import Sheet are only mandatory for the subset of fish being exported to the EU, staff from the processing companies indicated that these 'EU-only' permits are given less priority than all of the other permits issued by the port authority. Furthermore, permits are only issued during working hours, limiting the timeframe within which documents can be submitted and retrieved. As such the rhythm of seafood trade and bureaucratic processes are misaligned. As one respondent explained, "You can't just say, come get permits between 8 h and 17 h. Sometimes there are weather issues or fishing trips take longer than expected so while we can get product ready, we cannot get the SHTI [Derivative Sheet] in time to transport shipments [to the EU]". The port authority, as such, becomes a bottleneck in the process of obtaining the necessary export documents (see step 1 in Fig. 4).

The rhythm of obtaining SHTI-(Simplified) Derivative and Import Sheets is also misaligned with the rhythm and timing of the international freighting companies. Both sea and air freight companies are subject to strict time schedules. Delays in obtaining the SHTI permits means tuna exports miss ship or airplane departures. As one respondent shared, "we wait 3 days to get the certificate" and when they "commit to a fresh fish order … Need to ship product as soon as it lands". The consequence they argued is that companies are less likely to sell fresh fish to the EU and

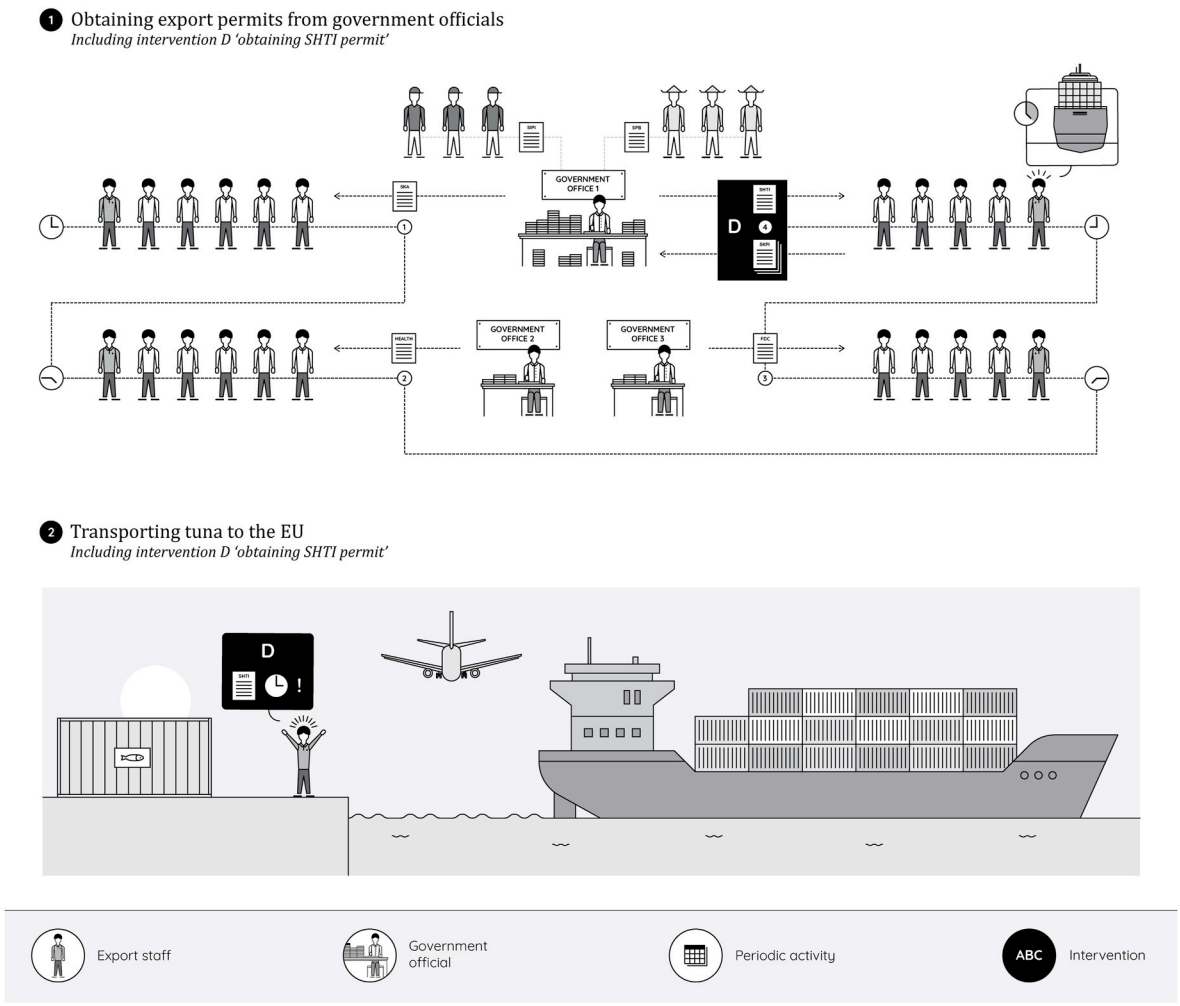

Fig. 4. Practices organising the flow of tuna and information in ports as (co-) performed by export staff. The image depicts periodic as well as daily sequential sets of practices within ports that are implicated by EU IUU regulation requirements that processors obtain SHTI permits from government officials (intervention D). The intervention is shown in the black boxes.

instead built up a stock of tuna to control their export capacity (see step 2 in Fig. 4).

6. Discussion - traceability interventions and response dynamics in tuna value chains

The responses generated by BRC certification and the EU IUU regulation catch certificate requirements enable us to open up the 'black box' of processor practices to understand the how new market demands for traceability are translated into locally embedded social practices. Building on Bush [3] and Spaargaren [25], the results demonstrate that the response to interventions in global value chains is neither singular or linear. That is, requirements of these regulatory and market interventions are not simply taken over, they are (1) translated into (new) performances of traceability practice and (2) variously incorporated into locally embedded social practices. Here we elaborate on how the translation and embedded incorporation of interventions ensuing from BRC certification and the EU IUU regulation catch certification requirements open up a new way of understanding response dynamics in global value chains.

First, response dynamics to interventions like BRC certification and EU IUU regulation can only be explained by analysing an interrelated set of social practices within (tuna) value chains. Response dynamics can take at least three different forms. The intervention can lead to the introduction of new information flows that transfer through a number of social practices, from catching, to landing and processing fish, which can lead to the transformation of these practices as practitioners seek to meet these demands [extending related observations of 36, 42]. The intervention can result in the reorganization of existing practices by introducing new hardware (machinery, technology) and/or software (skills, programmes) that require different competences and classifications of what and what not to include in reporting [cf. 43]. Finally, the intervention can bring about new social relations of power and trust among and between different groups of social actors operating within the value chain – for instance, diminishing or reinforcing the position of processing companies as embedded intermediaries in global trade [also see 12, 14, 16, 44, 45]. Common to all of these response dynamics are changes in the performance and embeddedness of the social practices that make up value chains and determine the extent to which and which traceability demands are met.

Second, by understanding performance and embeddedness we can observe how the de-routinization of existing (value chain) practices and their subsequent re-routinization to new traceability-related practices co-determines the nature of the response dynamics. Both BRC certification and the EU IUU regulation involved a number of new demands that led to the (temporary) interruption of well-established and taken for granted 'routines' that were more or less engraved in the minds and hands of their practitioners [39]. For instance, the introduction of BRC supplier audits de- and re-routinized the existing sets of practices such that the emergent food safety norms affected the structure and

performance of the interlinked practices in the tuna value chain [cf. 30]. The results also demonstrate that the re-routinization of practices were not all the same in terms of their likely persistence. In some instances the traceability interventions led to what are likely to be chain level changes. In other instances, the interventions led to adaptations in one or two existing practice (elements) as we go on to further describe below.

Both of the analytical steps enable an improved understanding of the nature, scope and intensity of response dynamics generated throughout the value chain as a result of interventions like enhanced traceability. In addition, we also observe two key differences in response dynamics when focusing in on the conduct of processing companies implementing traceability requirements within and beyond their direct control.

First, where processing companies can exercise control over chain related practices we observed adaptive responses in social practices. These responses were predominantly observed in relation to BRC requirements affecting practices within processing companies and where companies made material investments in their supply chains (e.g. building mini plants) in order to control traceability demands. Changes within processing practices refer both to the extension and deepening of the existing systems of information and monitoring, as well as to the reorganization of the processing such as changing the composition of production lots within the factory. For example, because the changes required to be BRC certified aligned well with existing goals for improving the (waste) performance through *existing* practices, the interventions were, as outlined above, rapid and adaptive rather than leading to more substantial chain level responses.

Second, more disruptive responses were observed where the traceability demands required the re-configuration of practices beyond the control of processors. Both BRC certification and the EU IUU regulation requirements instructed processors to extend traceability outside of their factories to a range of buying and selling, fishing and landing, administrating and licencing practices. It was far less straightforward for processors to find acceptable ways of re-organising the everyday routines of those performing these practices as these practices were not under the control of a single group of social actors. For example, the extension BRC requirements to suppliers were co-determined by the routines of fishers at sea as well as the material reorganization of mini-plants. Similarly, meeting EU IUU regulation requirements within ports was co-determined by the temporal and spatial (non)alignment of government bureaucratic and trade-related logistical practices.

Seen as such, the interrelations and interdependencies within and between social practices are fundamental to enabling or complicating the de- and re-routinization of fishing and landing practices and/or administrating and licencing practices. In both cases, material and social arrangements had to be developed that could not just be 'ordered from above' in the context of an existing formal (power) relations, as differences in the temporal (rhythms) and spatial dynamics of social practices needed to be dealt with.

The response dynamics identified here are in some ways specific to the demands of transparency placed on processors, their suppliers and government officials in Indonesia. However, evidence from wider research on the effects of market requirements on producers in other global value chains involving processor engagement with those they source from suggest our findings are more generalisable [see 7, 12, 30, 46]. In short, processors, as intermediaries of global market requirements, play a central role in shaping the practices of value chain actors. A social practice lens not only enables the description of these practices but also enables a clearer understanding of response dynamics to requirements such as transparency. Reconceptualising value chains as sets of interrelated practices offers novel insights for the design and uptake of interventions like traceability.

7. Conclusion

Traceability demands for seafood in both established and emerging seafood importing countries will continue to expand. Most notably, the US, Japan and China are at varying stages of establishing both public and private regulations and frameworks for seafood traceability. But the kinds of approaches that can evaluate whether and how these traceability requirements are taken up in the seafood value chains, has only recently been given attention. The social practices approach introduced in this paper provides a new way of exploring this uptake – by breaking down seafood value chains into its constituent practices and recognising that any uptake of traceability is dependent on the performance and embeddedness of these practices in complex societal settings.

While attempting to raise the bar on transparency and traceability, governance actors prescribing new 'ways of doing' for situated actors make themselves vulnerable when using only top down, arm's length approaches to effectuate changes. Disregarding the dynamics of social practices described here may lead to the exclusion of certain types of fisheries and their associated value chains from global markets. At the same time, the high demand for tuna from other markets may affect the ability of EU and others demanding enhanced traceability to source the required volumes of seafood in the near future. Alternative, more reflexive modes of intervening and governing are needed which can only be developed when detailed knowledge on situated social practices is available.

Declaration of competing interest

None.

CRediT authorship contribution statement

Mandy Doddema: Conceptualization, Investigation, Formal analysis, Writing - original draft, Writing - review & editing. **Gert Spaargaren:** Conceptualization, Writing - original draft, Writing - review & editing. **Budy Wiryawan:** Investigation, Writing - review & editing. **Simon R. Bush:** Conceptualization, Writing - original draft, Writing - review & editing.

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Appendix A. Supplementary data

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