

**IMPROVING FIJI'S ACCESS TO THE EU MARKET THROUGH  
DIGITALISATION OF TUNA PROCESSOR REPORTING SYSTEMS**

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## ABSTRACT

Fiji's offshore tuna fisheries sector is a basis of the nation's economy, with its export volume and value to the European Union being an indication of the sector's health and feasibility. This study provides an in-depth analysis of Fiji's tuna exports, focusing on the performance of the three main EU-established tuna processing companies and their compliance with EU standards. This study aims to analyse the critical role of developing a digitalised processing reporting system for catch certification within Fiji's offshore tuna fisheries sector. The main objective is to maintain market access, particularly to the EU, and improve industry efficiency and fish accountability. This study investigates the shift towards digitalised reporting systems in Fiji's tuna processing industry using a systematic approach. Initially, a literature review was conducted to establish a foundational understanding of the topic. Subsequently, a SWOT analysis was conducted to evaluate the feasibility of the proposed system against paper-based reporting systems. This research further incorporated stakeholder insights via interviews and questionnaires involving key industry participants and experts. The methodology facilitated a thorough examination of the transition's implications, highlighting the potential benefits of digitalisation in combating Illegal, Unreported, and Unregulated (IUU) fishing activities and improving industry practices compared to the current reporting systems. This research supports the idea that this transition would lead to increased market access, enhanced sustainability, and profitability for the Fiji Tuna processing industry. The study concludes that the digitalisation of tuna processors reporting systems is necessary to maintain Fiji's competitive edge in the EU market. It also underscores the strategic importance of digitalisation in ensuring a sustainable future for the industry. Fiji will need to include a detailed understanding of the Fish Accountancy system alongside the EU CATCH certification system, establish a robust legal and regulatory framework, engage stakeholders collaboratively, implement real-time reporting and tracking, ensure mass balance reconciliation, and design an effective certification and reporting system. These steps will enhance traceability and accountability, limit the risk of illegal, unreported, and unregulated (IUU) fishing activities, and support the health of seafood markets in both Fiji and the EU.

**Keywords:** Tuna fisheries, EU CATCH certification and traceability, IUU fishing, fish accountancy systems and digitalisation, market access and compliance, Fiji.

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## ABBREVIATIONS

The following is a list of the abbreviations used in this study.

AIS	Automatic identification system
ALB	Southern Albacore Tuna
BET	Bigeye Tuna
CATCH	EU-wide digital database of catch certificates
CA	Competent Authority
CDS	Catch Documentation Scheme
E-LOGS	Electronic Logbooks
EPA	Economic Partnership Agreement
EC	European Commission
EUMOFA	European Market Observatory for fisheries & aquaculture products
EUFCC	European Union Fishing Control and Certification
EUCC	European Union Catch Certification
EEZ	Exclusive Economic Zone
EU	European Union
FAO	Food and Agriculture Organization
FCAS	Fish Catch Accountancy System
FCC	Fiji Catch Certification
FFA	Forum Fisheries Agency
FFIA	Fiji Fishing Industries Association
GDP	Gross Domestic Product
IPOA-IUU	National Plan of Action to combat IUU
IUU	Illegal Unreported and Unregulated
MCS	Monitoring Control and Surveillance
MRL	Maximum Residue Levels
MSC	Marine Stewardship Council
OFMA	Offshore Fisheries Management Act
OFMR	Offshore Fisheries Management Regulation
PSC	Port State Control
PSMA	Port State Measures Agreement
RFMOs	Regional Fisheries Management Organization(s)
RGDP	Real Gross Domestic Product
SKJ	Skipjack Tuna
SOP	Standard Operating Procedure
SPC	South Pacific Commission (The Pacific Community)
SWOT	Strength Weakness Opportunities Threats analysis
TMDP	Tuna Management & Development Plan
UN	United Nations
UK	United Kingdom
VMS	Vessel Monitoring System
WCPFC	Western & Central Pacific Fisheries Commission
WCPFC	Western & Central Pacific Fisheries Commission Convention Area
WCPO	Western & Central Pacific Ocean
WWF	World Wildlife Foundation
YFT	Yellowfin Tuna



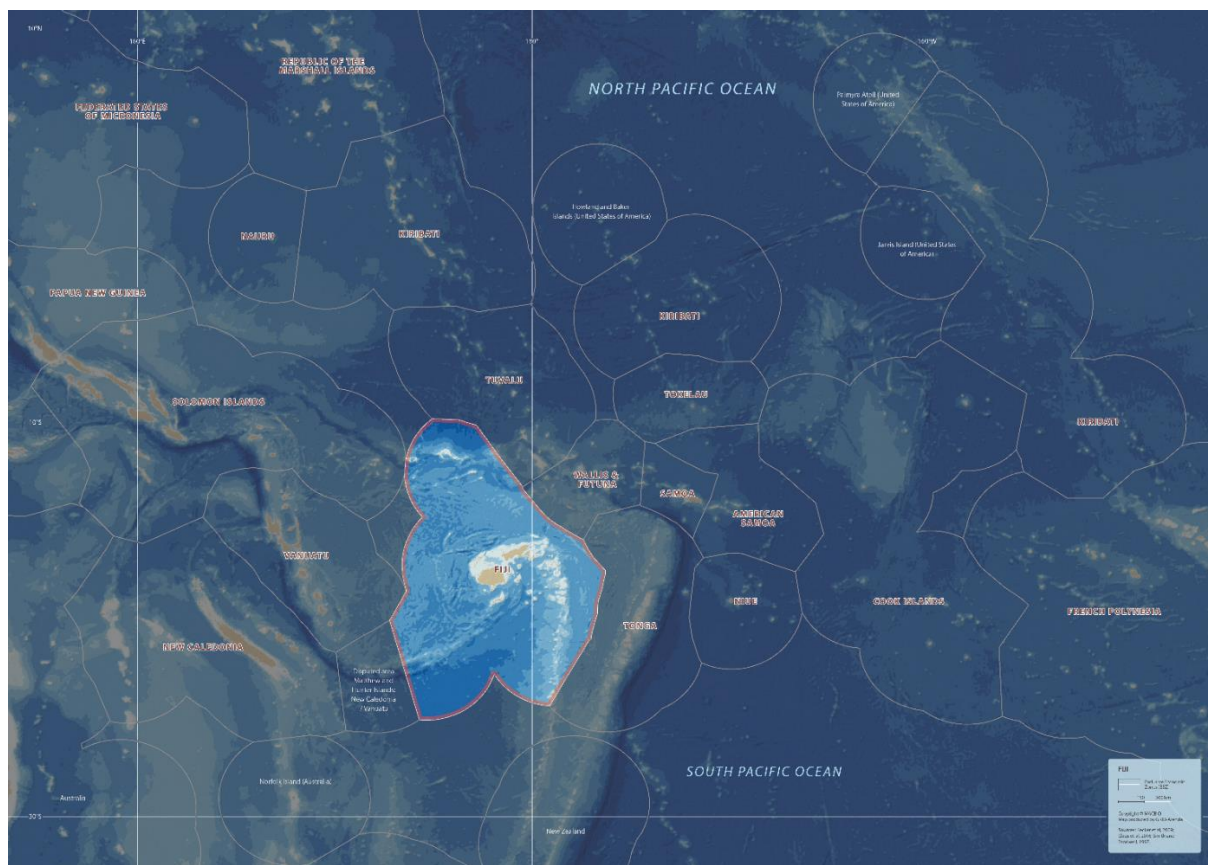


Figure 2. WCPO areas within the South Pacific Ocean

The Fiji Fisheries Tuna Industry plays a vital role in the overall growth and development of the country. The sector provides employment, income opportunities, access to food sources, and sustainable livelihoods, and assists in maintaining the balance of the ecosystem's biodiversity (Rosenberg, 2023). The Fiji fisheries tuna industry is the third-largest natural resource-based sector in the economy, contributing approximately 0.8% to the GDP and 12% of the total export earnings (Economy, 2020). Fiji Offshore Tuna catches are mainly Yellowfin Tuna spp. *Thunnus albacares*, Bigeye Tuna spp. *Thunnus obesus*, Albacore Tuna spp. *Thunnus alalunga*, and skipjack tuna species *Katsuwonus pelamis* (Fiji, 2023).

Fiji, a group of volcanic islands in the South Pacific, lies approximately 4,450 kilometres (2,765 miles) southwest of Honolulu and 1,770 kilometres (1,100 miles) north of New Zealand. The archipelago comprises 332 islands and 522 smaller islets, with approximately 106 of them being permanently inhabited islands. The total land area of Fiji is 18,272 square kilometres (7,055 square miles). The largest island, Viti Levu, covers approximately 57% of the nation's land area and hosts major cities such as Suva (the capital) and Lautoka. Vanua Levu, to the northeast of Viti Levu, covers just over 30% of the land area but is home to only about 15% of the population. Both islands are mountainous, with peaks rising abruptly from the shore and are covered in tropical forests. Fiji's economy benefits from the tuna industry, which contributes approximately 0.8% to the GDP. Approximately 200 million Fijian dollars are earned annually from tuna exports. The sector directly employs 15,677 people, including 1,677 fishing vessel crew members and 2,000 individuals involved in tuna processing. (Economy, 2020)

There are species of tuna domestically landed in ports that have authorisation permission to land the catch at a designated port which is normally Lautoka Wharf, Mua-i-walu Port, and

Princess Wharf in Suva and Levuka Port for processing of pelagic fish catch (Fiji Fishing Industry Association (FFIA), WWF-Pacific (WWF), 2021).

Generally, receiving ports are designated to receive pelagic fish species, such as tuna and other tuna-like species. Most often, these tuna species are caught by licenced longline fishing vessels. Any tuna catch intended for landing at a designated landing port must be authorised and approved for landing through an authorised landing permit (Department of Fisheries, 2022). In the initial stages, a vessel must ensure that it adheres to and corresponds to the initial stages of landing, ensuring that the landed catch is legally caught and sourced from an authorised licenced EEZ, where the Ministry of Fiji Fisheries takes the lead in ensuring that this requirement is met before the vessel comes into port (Department of Fisheries, 2022).

### Regional Fisheries Management Organisation - The Western and Central Pacific Tuna Fishery

Tuna fisheries in the Western and Central Pacific Ocean (WCPO) fall within the Western and Central Pacific Fisheries Commission Convention Area (WCPFC-CA). These fisheries are highly diverse, ranging from small-scale- artisanal operations to large-scale- industrial purse seine, pole-and-line, and longline fisheries operating within Pacific Island states' Exclusive Economic Zones (EEZs) and on the high seas. The main species targeted by these fisheries is Skipjack Tuna.

The WCPFC plays a crucial role in managing tuna fisheries in the region, including implementing measures to prevent overfishing and maintain sustainable stock. Fiji tuna processing companies must adhere to WCPFC regulations, making stock status information relevant for ensuring regulatory compliance.

### Overview of Stock Status of Interest to the WCPFC

Table 1 provides essential information on the status of key tuna stocks in the Western and Central Pacific regions, helping governing countries and their individual tuna industries and processing plants monitor and manage these valuable fisheries resources. The overview shows the stock status of tuna species relevant to the Western and Central Pacific Fisheries Commission (WCPFC).

Table 1. Overview of the status of tuna stocks in the Western and Central Pacific Ocean (WCPO) (source: SPC FAME).

Stock	Latest Assessment	Overfished <sup>i</sup>	Overfishing <sup>1</sup>	Next Assessment
<b>WCPO Tuna</b>				
01 Bigeye tuna ( <i>Thunnus obesus</i> )	2023 (SC19)	No (0%) <sup>ii</sup>	No (100%) <sup>iii</sup>	2026
02 Yellowfin tuna ( <i>Thunnus albacares</i> )	2023 (SC19)	No (100%)	No (100%)	2026
03 Skipjack tuna ( <i>Katsuwonus pelamis</i> )	2022 (SC18)	No	No	2025
04 South Pacific albacore tuna ( <i>Thunnus alalunga</i> )	2021 (SC17)	No	No	2024

These assessments confirm that bigeye tuna and yellowfin tuna are not overfished and are not subject to overfishing. The next assessments for both are expected to be conducted in 2026. Skipjack tuna, assessed in 2022, is also not overfished and is not experiencing overfishing, with the next assessment due in 2025. The South Pacific albacore tuna, assessed in 2021, is likewise

not overfished and not subject to overfishing, with the next assessment scheduled for 2024. Although we must consider that the determination of overfished and overfishing is not a firm statement since a percentage is provided that indicates probability. However, these assessments play a crucial role in fisheries management decisions, ensuring sustainable tuna populations and responsible fishing practices in the region.

With data on the status of the four main tuna stocks, Fiji will be able to understand the availability and health of tuna stocks in the region. The status of tuna stocks directly impacts the sourcing and processing activities of tuna processing companies in Fiji.

Fiji-based tuna processing companies and the fishing industry rely on tuna catches sourced and caught by licenced longline fishing vessels in the Western and Central Pacific Ocean (WCPO). The stock status provided in Table 1 informs these companies about the health and sustainability of tuna populations, influencing their sourcing decisions (WCPFC, 2024).

Fiji tuna processing companies and the fishing industry must anticipate potential changes in stock status and plan their operations accordingly. For instance, if an upcoming assessment indicates a decline in tuna stocks, companies may adjust their processing capacity or seek alternative sourcing strategies.

The health and sustainability of tuna stocks impact Fiji's ability to access international markets, including the EU market. Positive stock status signals sustainability practices, which can enhance Fiji's reputation as a responsible seafood supplier and improve market access opportunities.

The tuna industry is important to Fiji's economy, providing significant employment opportunities and contributing to the country's GDP. This transition towards digitalisation represents a proactive and innovative step in bolstering the industry's efficiency and competitiveness in the global market. By adopting such measures, the industry demonstrates its commitment to sustainable practices and ensures that it remains a source of national pride and economic stability. Exports to the EU market are a significant source of revenue. However, challenges in reporting systems have hindered Fiji's access to the EU market. This project aims to address these challenges by digitalising the tuna processor reporting system, thereby improving efficiency and compliance with EU regulations.

## **1.1 Rationale**

The Fiji Tuna fishing industry stands as a basis of the nation's economic framework, with its success heavily reliant on the exportation of processed and semi-processed tuna to the European Union (EU) and other global markets (Department of Fisheries, 2022). Despite its significance, the industry faces pressing challenges that threaten sustainability and profitability. A notable decline in production has been observed, compounded by the EU's escalating concerns regarding the accuracy of catch reporting in the supply chain (EUMOFA, 2023).

Historically, the industry has lacked transparency, as evidenced by the issuance of a yellow card in 2012 and subsequent inconsistent advancements in processing standards for the European Union (EU) market (Environmental Justice Foundation, 2016). The Ministry of Fisheries has long aspired to instal a culture of transparency, particularly in the accurate reporting of catches destined for processing and export since 2014 (Department of Fisheries, 2022). However, this ambition has been hindered by an unclear reporting system, leading to doubts regarding the integrity of the processing report system along the supply chain.

The adoption of digital technologies presents a pivotal opportunity for the industry to revolutionise its operations. By transitioning from old-fashioned paper-based systems to sophisticated digitalised processing reports and catch certificates, the industry can enhance efficiency, reduce costs, and support transparency (European Commission, 2014). This digital shift is not merely a strategic move but an urgent need to align with the FAO Port State Measures Agreement (PSMA) and address the EU's market standards (FAO, 2009; European Commission, 2021).

The implementation of digital solutions is imperative for the Fiji tuna fisheries industry to secure its position in the international market and remain competitive. It is a strategic endeavour aimed at meeting stringent market standard requirements for exporting to key regions such as the EU, USA, Canada, Japan, and Asia Pacific. (European Commission, 2014) Furthermore, it is a proactive measure to avert additional penalties or the risk of being yellow carded again.

Embracing digitalisation within the Fiji tuna fishing industry is clear: it is a critical step towards ensuring the industry's longevity, maintaining market access, and upholding the standards of transparency and accountability demanded by international partners (Voyer et al., 2017).

## **1.2 Main objective:**

The project's main objective is to analyse the importance of developing a digitalised processing reporting system for catch certification within Fiji's offshore tuna fisheries sector, aimed at maintaining access to the EU market, improving industry efficiency, and promoting fish accountability.

### *1.2.1 Research specific objectives:*

1. Evaluate the evolution of Fiji's offshore tuna fisheries sector from the time the yellow card was lifted to the present, focusing on the assessment of the existing paper-based processing and certification systems.
2. Investigate Fiji's response to receiving a yellow card for non-compliance and analyse the strategies and best practices employed to address the issue.
3. Evaluate the need to transition from paper-based to digitalised reporting and certification, focusing on the potential for cost-effectiveness, ease of implementation, and compatibility with existing systems.

### *1.2.2 Research Questions:*

Why is it important for Fiji to successfully develop a transition from paper-based processing and certification systems to digitalised reporting in its offshore fisheries tuna industry, ensuring compliance with EU regulations, enhancing efficiency, and promoting sustainability?

## 2 LITERATURE REVIEW

### 2.1 Fiji fisheries and the importance to its economy

The Fiji Fisheries sector serves as the backbone of the nation, supporting local food consumption, generating income for coastal households, and contributing to cultural practices and traditions (Fiji Ministry of Economy, 2020). Additionally, coastal fisheries contribute to the tourism industry by attracting tourists to engage in recreational activities, stimulating economic activity and employment opportunities in the tourism sector (Fiji Ministry of Economy, 2020). In contrast, offshore fisheries, particularly the tuna industry, play a pivotal role in Fiji's economy by providing employment, income opportunities, and access to food sources. The tuna industry is the third-largest natural resource-based sector in the economy, contributing significantly to GDP and total export earnings. With a diverse range of tuna species, including yellowfin tuna, bigeye tuna, albacore tuna, and skipjack tuna, Fiji's offshore fisheries play a crucial role in maintaining ecosystem biodiversity and sustainable livelihoods for coastal communities (Department of Fisheries, 2022).

#### 2.1.1 Overview of tuna processing industry in Fiji

The tuna processing industry in Fiji plays a crucial role in the country's economy and the broader Pacific region. With its abundant tuna resources and strategic location in the Western and Central Pacific Ocean, Fiji has emerged as a significant player in the global tuna industry. Tuna processing in Fiji involves various stages, including fishing, landing, processing, and exporting, with key stakeholders, including fishing companies, processing facilities, regulatory authorities, and international markets.

Fiji's tuna processing industry primarily focuses on yellowfin, skipjack, and albacore tuna, which are abundant in the region. Processing facilities in Fiji are equipped with modern technology and adhere to international standards to ensure the quality and safety of tuna products. These facilities employ thousands of Fijians and contribute significantly to the country's GDP (Bell et al., 2009).

#### 2.1.2 Fisheries sector contribution to Fiji's economy

Official statistics published by the Fiji Bureau of Statistics (FBOS) showed that fishing and aquaculture contributed FJD 49.8 million to Fiji's real gross domestic product (Real GDP) in 2021, a decline of FJD 11.3 million (-18.5%) compared to the 2020 contribution of FJD 61.1 million (Fiji, 2023). The sector also contributed FJD 7.1 million to real GDP growth in the manufacturing industry in 2021, an increase of FJD 83,596 (1.2%). Combined fisheries-related activities within the fisheries sector contributed FJD 56.9 million (0.7%) to the national real GDP in 2021 (Department of Fisheries, 2022).

Figure shows a graph that depicts the total and percentage contributions to Real Gross Domestic Product (RGDP) from two sectors related to the fishing industry: processing and preserving fish, crustaceans, and molluscs, as well as fishing and aquaculture. The data covers the years 2019–2021. The fishing and aquaculture industries have played a significant role in the economy, although their total value has decreased. The blue line above the bar represents the total contribution to Real Gross Domestic Product (RGDP). We observe a decline in the total factors, such as market dynamics, environmental conditions, and technological advancements, which may have influenced these trends.

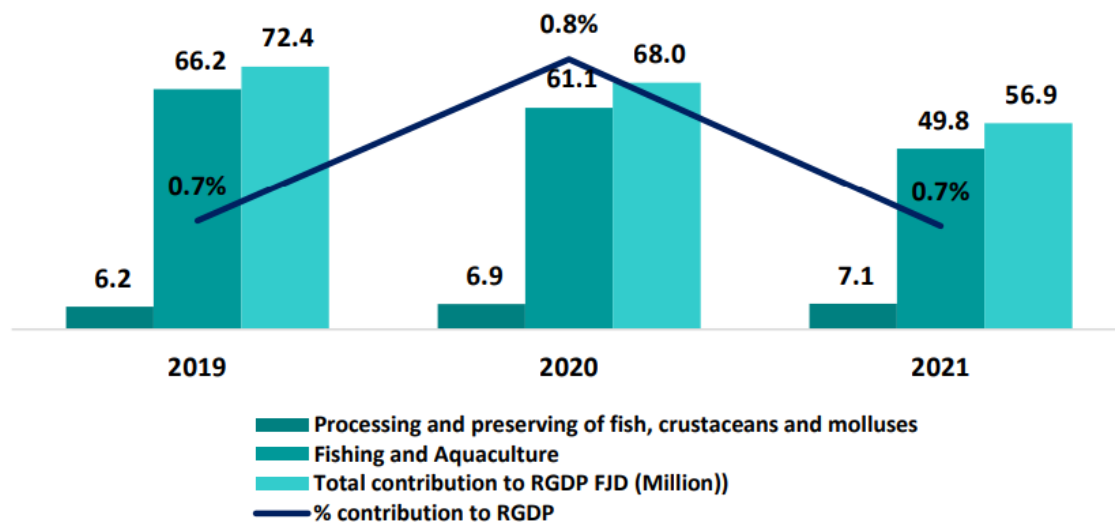


Figure 3. Fisheries sector contribution to real gross domestic product 2019-2021 in FJD (millions). Source: Fiji Bureau of Statistics.

The fisheries sector contributed FJD 149.8 million (FJD) (8%) to national export earnings in 2021. A sharp decline of FJD 37.2 million (-19.9%) was seen as the adverse impact of the COVID-19 pandemic compared to the 2020 export earnings of FJD 187 million (Fiji Ministry of Economy, 2020).

Figure 3 illustrates the decline in total fisheries exports and the percentage of total exports from 2019 to 2021, while showing a slight increase in prepared/preserved fish exports in 2021. The blue line above the bar represents the total value of Fiji’s fisheries exports, as we observe a gradual decrease in total exports over the specified period. The Fiji fisheries industry faces challenges, but it continues to play a significant role in the economy.

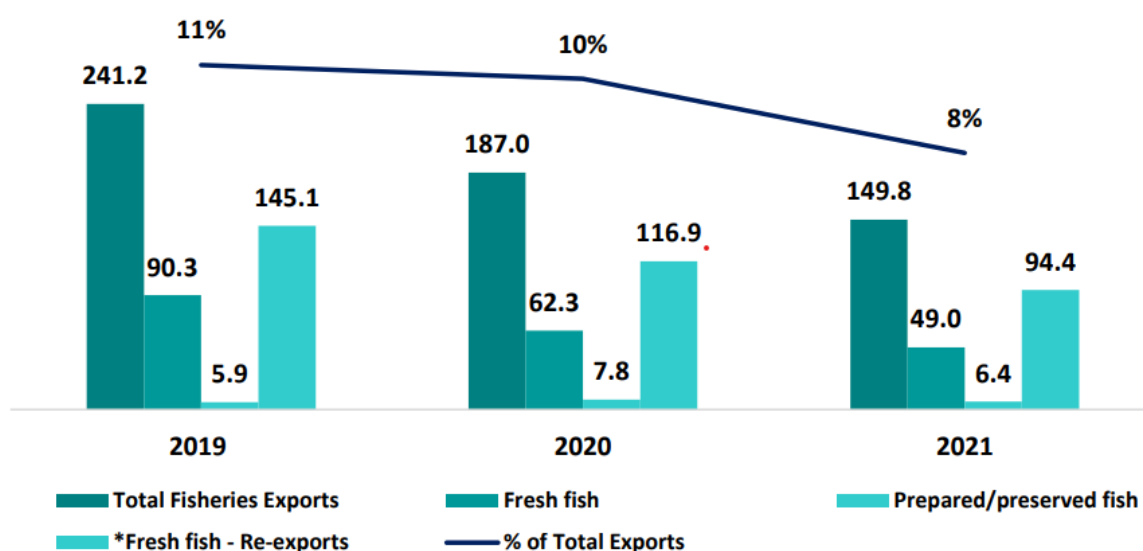


Figure 3. Fish exports by standard international trade classification 2019 – 2021 in FJD (millions). Source: Fiji Bureau of Statistics.

However, the tuna processing industry in Fiji faces several challenges, including competition from other tuna-producing countries, fluctuating tuna stocks, and compliance with international regulations, such as those set by the European Union and the Western and Central Pacific Fisheries Commission (WCPFC) (Gillett and Cartwright, 2012).

Additionally, the industry must navigate environmental concerns such as overfishing and bycatch to ensure the sustainability of tuna stocks for future generations. Fiji's tuna processing industry thrives because of innovation, partnerships, and sustainability efforts (Fisheries, (2021). By addressing these key issues, Fiji aims to remain a top tuna processing hub in the Pacific region. The industry has fulfilled its social responsibilities. Notably, it generates close to 200 million Fiji dollars annually and employs over 15,677 people, including fishing vessel crews and tuna processing workers (Fiji Ministry of Economy, 2020).

In addition, approximately 16, 000 people are directly employed in the sector throughout the supply chain (Department of Fisheries, 2022).

There are species of tuna domestically landed in ports that have authorisation permission to land the catch at a designated port which is normally Mua-i-walu Port and Princess Wharf in Suva and Levuka Port for processing pelagic fish catch.

Normally, designated receiving ports handle pelagic fish species, including tuna and similar tuna-like species, which are brought in by fishing vessels to unload their catch. The authorisation for landing tuna is granted through a proper permit. During the initial stages of landing, vessels must adhere to specific protocols to ensure that the catch is legally landed. The Ministry of Fisheries oversees these critical processes and addresses any sensitive issues related to landed catch.

## **2.2 The EU market and its importance**

The European Union (EU) sustains its high consumption of fishery and aquaculture products primarily through imports, positioning itself as a global trade leader with the second-largest market after China and the largest established consumer market after China and Indonesia. Despite inflation affecting food prices and reducing at-home fish consumption, the EU's household spending on these products rose in 2022, with tuna imports, particularly skipjack and yellowfin from Ecuador, playing a significant role in market dynamics. This was analysed by the European Market Observatory for Fisheries and Aquaculture (EUMOFA), which also tracks the self-sufficiency rate, reflecting the proportion of domestic seafood meeting consumption needs, showing fluctuations influenced by import levels and tuna catches (Figure 5).

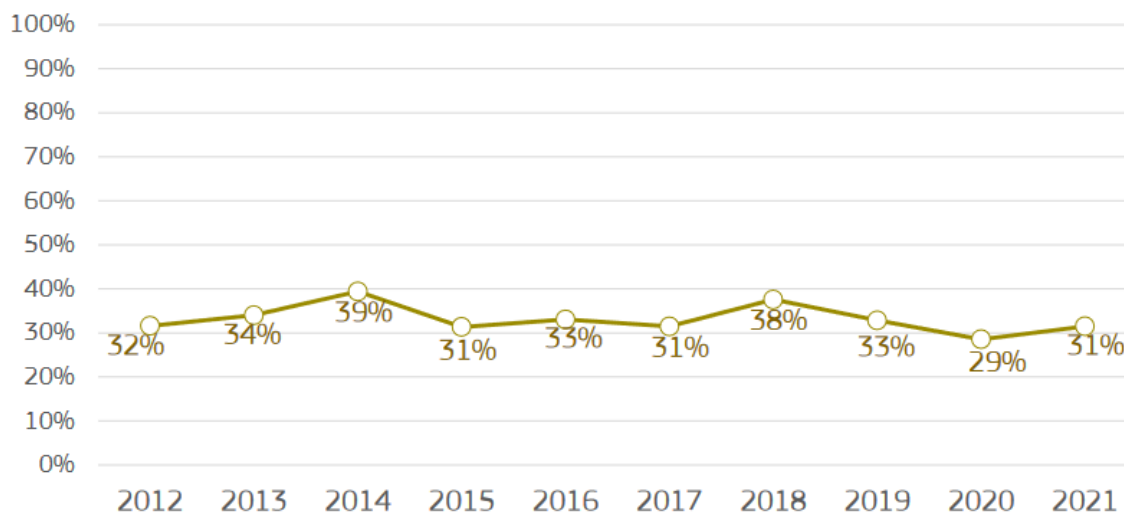


Figure 4-Self-sufficiency rate for tuna. Source: EUMOFA, based on EUROSTAT (online data codes and FAO data).

### 2.3 Oceania's (Pacific Islands) influence on the EU market

Oceania, also known as the Pacific Islands, is a vast geographical region spanning the Eastern and Western Hemispheres. It encompasses a diverse array of islands scattered throughout most of the Pacific Ocean (Rosenberg, 2023). In 2022, tuna played a significant role in the EU fish markets. It accounted for 10% of the total volume and value of fish imported into the EU (Rosenberg, 2023).

Fiji tuna fisheries catch by licenced and foreign chartered vessels is conducted through longline fishing (Fiji Fishing Industry Association (FFIA), WWF-Pacific (WWF), 2021).

Fiji tuna-flagged and foreign chartered longlines mostly catch tuna and tuna-like fish, such as the Southern Albacore Tuna (*Thunnus alalunga*), like its other regional counterparts, is known for its long pectoral fins and streamlined body, the yellowfin tuna (*Thunnus albacares*), known for its yellow dorsal and anal fins, and the bigeye tuna (*Thunnus obesus*), identifiable by its larger size and distinctive golden iris. Skipjack tuna (*Katsuwonus pelamis*) is also found in Fiji's waters, although they are not common. They are recognised for their distinctive dark stripes along the back and pointed fins (Department of Fisheries, 2022).

#### EU addresses compliance issues with non-compliance importing countries.

The European Union is the world's largest seafood product market, importing approximately 60% of its overall consumption (EUMOFA, 2023). Initially, the quantity of illegal seafood products imported into the EU was assessed. The European Commission (EC) initiates dialogues with the authorities of importing countries to understand the systems in place to prevent IUU Fishing (EUMOFA, 2021). This dialogue is initiated, and if the national authorities cooperate with the EU, the dialogue tries to understand and resolve any compliance issues. In most cases, at this stage, countries take sufficient action to improve their fisheries management practices and control systems, where carding is unnecessary (EUMOFA, 2021).

In November 2012, the European Commission identified Fiji as one of the countries that had failed to discharge its duties under international law to act against IUU Fishing, which includes Fiji revising Fiji Fisheries legislation, adopting a National Plan of Action to combat IUU (IPOA-IUU), and strengthening monitoring, control, and surveillance (Council of the European Union, 2008). The European Commission then notified Fiji, giving a timeframe to address this issue; thus, a pre-identification or yellow card was announced publicly for Fiji to recommit to the proposed measures for improvement (EJF et al., 2016).

In later years, Fiji took a step to gazette Fiji Catch Certificate Regulations and conditions based on EU Market requirements, where EU officials reviewed the fisheries regulations and lifted the yellow card in 2014 (EU, 2022). After the yellow card was lifted, the EU Commission continued to cooperate with Fiji and identify backsliding as it arose. Figure 6 depicts the status of EU trade volume with carded countries recorded in May 2022.

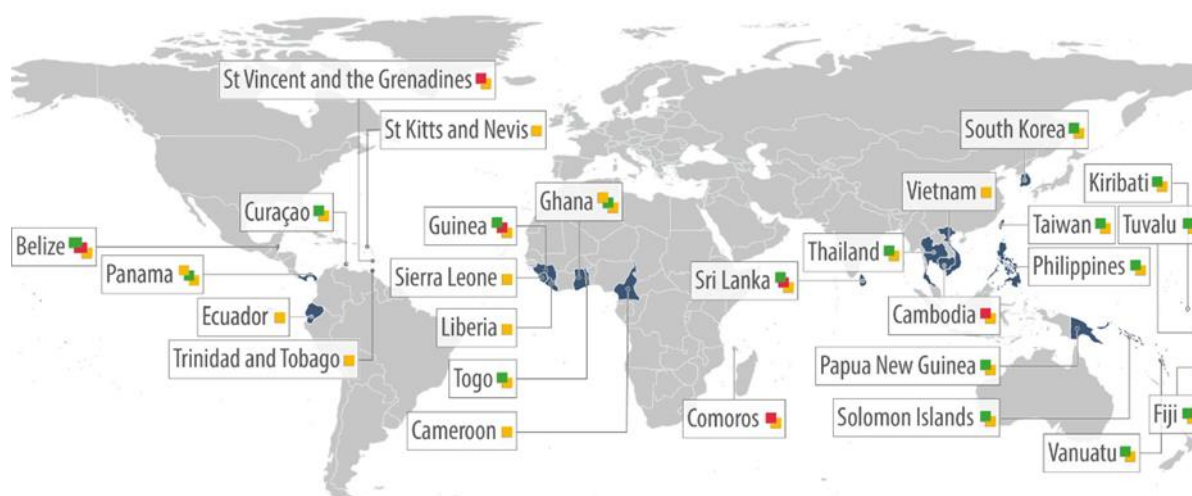


Figure 6. Location of the countries pre-identified and identified as non-cooperating. Source: DG MARE. Overview of IUU procedures, September 2022.

A total of 27 countries had received yellow cards up to September 2022 (Figure 6). Fourteen had their pre-identification lifted after periods varying between 10 and 56 months, but two countries subsequently received a second yellow card (EJF et al., 2016). For six of the pre-identified countries, the procedure continued with a red card and listing, of which three countries were delisted after 13, 20, and 35 months. Currently, nine countries have yellow cards and three have red cards (Council of the European Union, 2008).

#### 2.4 Fiji's yellow card journey: addressing fisheries challenges

In 2012, the European Union issued Fiji a yellow card for non-compliance with international fisheries laws and the EU IUU Regulation. The yellow card served as a formal warning signalling that Fiji needed to improve its measures to combat IUU Fishing practices (Council of the European Union, 2008).

Fiji had failed to meet its obligations as a flag state to control and monitor its fleet and poor seafood traceability schemes (Fisheries, 2021).

Fiji had faced challenges related to fisheries management, traceability, and compliance with limited resources and poor traceability systems, not to the extent of proper traceability practices.

Therefore, Fiji should take steps to address these problems. In 2014, the Fiji Competent Authority was established under the Ministry of Health (Ministry of Health, 2011). The yellow card prompted Fiji to take swift action to address these deficiencies (Department of Fisheries, 2022).

It was not an easy task for Fiji to prove that fish do not become illegal during processing when initially caught illegally. Therefore, the onus is on the port state, such as Fiji, to allow or disallow a vessel offloading its catch in Fiji's port authority to prove that the fish was initially illegally caught from an authorised fishing ground by the flagged vessel.

Normally, log sheets are filled by the captain coming into port, often deemed legal by the vessel captain as legally caught fish recorded by the vessel log sheet. This has not been proven otherwise because there was no system in place for fishing vessel operators to maintain a trip or voyage coding system to monitor logistics (Fiji Fishing Industry Association (FFIA), WWF-Pacific (WWF), 2021). At that time, the authorisation to land was not effectively done by the authorities in the port in a complaint response to pre-determine the risk analyses based on the characteristics of the vessel. Fiji implemented effective strategies to improve the measures set in place which overall gives a willingness to cooperate closely with the requirements of the EU markets (Fiji Fishing Industry Association (FFIA), WWF-Pacific (WWF), 2021).

## **2.5 Measures set in place for Fiji to uplift the yellow card.**

### *2.5.1 Fiji fisheries legislative review and adoption*

In 2012, the EU issued yellow cards to Fiji for non-compliance with international fisheries laws and the EU's IUU Regulation (Environmental Justice Foundation et al., 2015). The yellow card highlighted the need for swift action by Fiji to improve domestic fisheries management and legislation (Fiji Fishing Industry Association (FFIA), WWF-Pacific (WWF), 2021). Over the next two years, Fiji initiated a substantial commitment to improving its fisheries management and control systems, as well as a willingness to cooperate closely with the EU to achieve the necessary changes. Fiji has undertaken a substantial review of its fisheries legislation and policy (Department of Fisheries, 2022).

In the same year that Fiji was yellow-carded, it pushed for the gazetting of the Offshore Fisheries Management Act which reviewed the results of the existing Fisheries Act (Environmental Justice Foundation et al., 2015). This legislative review and adoption of new legislation are essential steps toward setting up an MCS Legal framework in providing some form of effort in strengthening a robust network to contribute to conservation, sustainable fisheries, and livelihoods.

Legislative instruments relating to fisheries management have provided legal support for Fiji to implement programs and systems within responsible institutions. In this study, there are legislative instruments that provide for data collection, catch certification, and traceability systems (Department of Fisheries, 2022). These tools are important as they are the driving forces to ensure the sustainable management of fishery resources.

The Offshore Fisheries Management Act of 2012 and the Offshore Fisheries Management Regulation of 2014 are crucial legal frameworks in Fiji that govern offshore fisheries. Let us break down their significance and how they relate to catch documentation and certification standards.

The Offshore Fisheries Management Act 2012 serves as the legal cornerstone for managing and conserving offshore fisheries in Fiji (Department of Fisheries, 2022). Its key provisions include licencing, authorisation, and conservation measures. By setting guidelines for sustainable

fishing practices, the Act ensures the long-term viability of marine resources. It simplifies complex legal concepts related to fisheries, making them more accessible to the public. Additionally, the Act empowers the Fijian government to regulate fishing activities within its exclusive economic zone (EEZ) and territorial waters (Fisheries Act, 2012).

The Offshore Fisheries Management Regulation 2014 serves as a crucial complement to the 2012 Act by providing detailed rules and procedures. These regulations cover various aspects of fisheries management, including catch certificates and licences. Notably, the specific provisions related to catch documentation and certification standards include the Fiji Catch Certificate (Regulation 14), which ensures traceability and accountability for catches. This certificate helps to verify the legality and origin of fish products. Additionally, the Licences and Authorisations (Regulations 15–30) outline the licencing process for fishing in Fiji’s waters and exclusive economic zone (EEZ). These regulations set standards for fishing vessels, sports or recreational fishing, and exploratory test fishing (Fisheries Regulations, 2014).

In summary, these laws play a vital role in managing Fiji’s offshore fisheries, promoting sustainability, and ensuring proper documentation and certification of catch. They contribute to responsible fishing practices and protect marine ecosystems for future generations to come.

### *2.5.2 Fiji fisheries policy and regional fisheries legal MCS frameworks*

Fiji made a step-in recruitment and trained fisheries authorised staff with an effective enforcement system that will maximise compliance and reduce IUU fishing, especially under strict future management regimes.

Revising domestic laws to increase monitoring and control of their waters Fiji adopted the Offshore fisheries management laws which is the Offshore Fisheries Management Act 2012 and its subsidiary legislation the Offshore Fisheries Management Regulation 2014 which gave leeway for new policies and legislative control measures in Fiji Ports over Flagged Vessels and Foreign Fishing Vessels intending to unload fish catch in Fiji Ports.

Within the scope of setting regional legal frameworks within the Regional Fisheries Management Organisation regions (WCPFO), the Fiji Fisheries legislation – Section 54 of the Offshore Fisheries Management Act 2012—establishes and grants the Minister for Fiji Fisheries powers concerning measures established by regional fisheries management organisations. These provisions automatically give subordinates and enable Fiji to engage in regional cooperation, adopt international standards, and contribute to sustainable regional fisheries management. This is where the FAO Port State Measures Committee came up with a legally binding instrument, the FAO Port State Measures Agreement, which was found and approved by the FAO Conference at its 36th Session on 22 November 2009 (FAO, 2024).

The FAO Port State Measures Agreement plays a crucial role in advancing fisheries management. Specifically, digitalisation measures combat illegal, unreported, and unregulated (IUU) fishing (FAO, 2024). By implementing digital processing report systems, the industry ensures transparency and verifies the legality of fish and fishery product exports, especially for markets such as the EU and other international buyers (FAO, 2023).

These fisheries laws strengthen sanctions and enforce them against vessels involved in IUU activities, international law obligations, and adopting an adequate legal framework for fighting IUU (Fisheries, 2021). This eventually gave Fiji a commitment to comply with international legal standards to combat IUU Fishing practices. The FAO Port State Measures Agreement is significant in allowing Fiji to control its ports from any IUU fishing practices through digitalisation of port use access systems with compliance to international standards. A key element that has been providing the EU’s carding process is the evaluation of the capacity of

each developing country to fulfil its international obligation to combat IUU and its compliance index (EJF et al., 2016).

The EU continues its cooperative dialogue with 3rd world countries, ensuring further changes in their fisheries management and control systems as a ratification of the FAO Port State Measures Agreement (Council of the European Union, 2008). Fiji has seized the opportunity to cooperate with the EU by undertaking the necessary reforms to effectively fight IUU fishing and consequently improve the marketability of Fiji's fisheries products (EJF et al., 2016).

Fiji has taken significant steps to address the shortcomings of its fisheries sector. By establishing a health-competent authority, cooperating with the EU, and implementing reforms to combat illegal fishing (IUU).

Fiji aims to enhance the marketability of its fishery products. These efforts align with the FAO Port State Measures and include the issuance of catch certificates for exports to the EU market. Overall, Fiji's commitment to sustainable practices and trade relations demonstrates its proactive approach to fishery management and market access.

### *2.5.3 Fiji competent authority – Ministry of Health*

EU-issued formalities for Fiji to designate its own National Competent Authority that will play a crucial role in ensuring regulatory compliance, safety, and quality contributing to bringing Fiji back to the list of approved exporters of Fish and Fishery Products to the EU market. (Health, 2011)

The Fiji Government responded to the delisting of Fiji from the list of approved exporters of Fish and Fishery products by establishing a Food Unit within the Ministry of Health with the responsibility of inspecting, assuring quality, and controlling fishery exports to the EU market (Ministry of Health, 2011).

The role of the Food Unit as a compliance agency for the EU and other importing countries for safety requirements is to facilitate fish export, inspection, certification of safety and health of fish and fish products, and verification of standards with procedures to ensure compliance within the EU Market. After Fiji was issued a yellow card and delisted from the list of importers to the EU market, the Competent Authority of Fiji made a great impact by setting its objective straight, ensuring providing technical assistance under the Aid for Trade initiative that assisted the Competent Authority to better equip the Unit in terms of formulating the development of National Control Plan, Monitoring Plan, training, and capacity building programs in ensuring standards are met and followed.

Notably, Fiji's health-competent authority and the Ministry of Fisheries have been renowned and recognised for cooperating with the EU to combat illegal, unreported, and unregulated (IUU) fishing practices. This international engagement has enhanced the marketability of Fiji's fisheries products, especially in the EU market, by complying with international standards.

In the end as a learning experience, Fiji earned its place in 2014 on an EU-approved list and the Fijian Authorities were in the position to sign the public health requirements laid down in Part II.1 of the Model Health Certificate for imports of fishery products intended for human consumption described in Appendix IV to Annex VI Commission Regulation (EC) No 207/2005 (Ministry of Health, 2011).

#### 2.5.4 *Trade and economic relations between EU and Fiji*

In 2014, Fiji started applying the interim Economic Partnership Agreement (EPA) between the EU and the Pacific which it had signed in 2009 (EJF et al., 2016). The EPA gives all Fijian products duty-free, quota-free access to the EU market, the world's largest single market (Council of the European Union, 2008). It helps the country to alleviate poverty and create jobs based on international values and principles, including sustainable development and human rights (EUMOFA, 2023).

Fiji exports fish, water, gold, and sugar to the EU market. Fiji imports manufactured goods, machinery and equipment, petroleum products, foodstuffs, and chemicals from the EU. Australia, Singapore, the US, and New Zealand are also Fiji's major trading partners. (EUMOFA, 2023)

Fiji and the EU are engaged in the Pacific region through the Pacific Islands Forum (PIF) and the Pacific Community (SPC). The Organisation of African, Caribbean, and Pacific States (OACPS) coordinates ACP-EU policy dialogues (Gillett and Cartwright, 2010).

The EU and its Member States supported Fiji through the Team Europe response to the COVID-19 pandemic (EUMOFA, 2023).

Fiji has been scrutinised and faces challenges related to fisheries management, sustainability, and compliance with international standards. The yellow card status has implications for trade, market access, and reputation within the global fishing community. This indicates that Fiji's manually laid-back system has led to this insignificance; thus, Fiji will need to be given a chance to improve from this setback.

To gain a deeper understanding, this study probes the specific issues that led to Fiji's yellow card and the subsequent actions taken to address them. Overall, this study highlights the importance of adhering to responsible fishing practices and maintaining transparency in the industry. The digitalisation of the processing reporting system would create a great advantage in ensuring that Fiji does not return to its initial stage of non-compliance with the EU market standard specifications.

Figure 7 shows that Fiji received a yellow card in November 2012. A yellow card typically serves as a warning or precautionary measure in various contexts. In 2012, the commission informed Fiji that it would be de-listed from the developing countries importing fish and fishery products to the EU market. At some point, Fiji was recognised as a flag of non-compliant states (EJF et al., 2016).

This action implied the potential suspension of Fiji from the EU's list of authorised exporting countries due to identified non-compliance issues. These issues were primarily related to weaknesses in fisheries governance, monitoring, control, and surveillance within segments of Fiji's offshore fishing industry, where practices did not fully meet the standards established by the European Union.

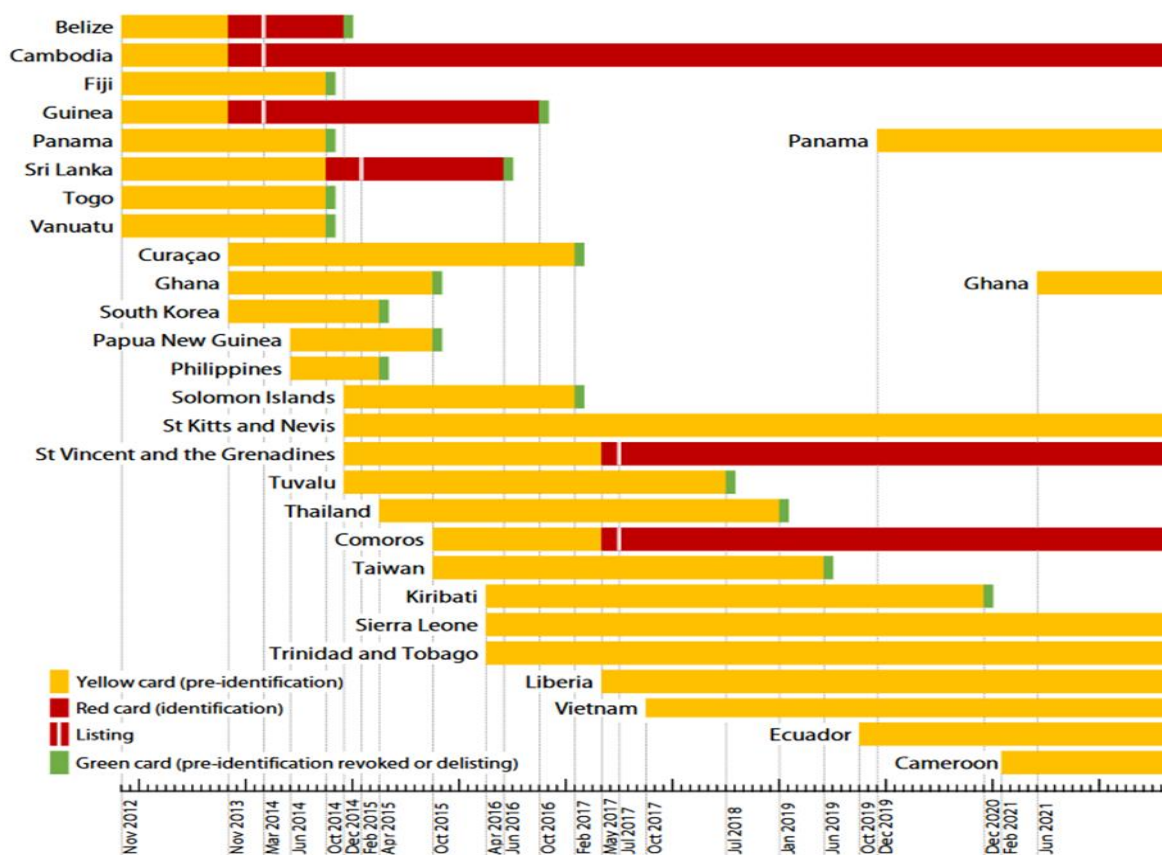


Figure 5. Overview of carding procedures. Data source: DG MARE. Overview of IUU procedures, September 2022.

### 2.5.5 Port state measures

Fiji’s delisting from the EU importers list was a formal warning, giving a signal of concern and a call for corrective action to address these issues. FAO Port State Measures paves the way to assist Fiji by providing technical assistance, capacity building, and policy guidance to enhance its fisheries governance, monitoring, and enforcement systems. With technical advice and assistance from the FAO PSM, Fiji was able to recognise its rights and responsibilities as a ‘port state’ in combating Illegal, Unreported, and Unregulated fishing (IUU) (FAO, 2023).

A ‘Port State’ has its roles and functions as a gatekeeper and ensures that IUU-caught fish are not landed, thereby restricting their entry into the market. (Council of the European Union, 2008) If vessels conduct IUU fishing practices in any fisheries waters or high seas then the vessel is not allowed to land or tranship its product within the vicinity of any designated landing port are fisheries waters of the port state.

Port States establish a series of requirements termed port state measures, in which a particular vessel that wishes to land or tranship its catch within the vicinity of a gazetted port must comply with these conditions upon arrival to access port use within the port state. (Fiji Ministry of Economy, 2020) These requirements include prior notification of port entry, notification and landing application on fish catches landed, supply and services requirements, documentation requirements, and port inspection.

Port State Measures must be consistently applied across maritime regions. RFMOS e.g. WCPFC Western Central Pacific Fisheries Commission looks after the measures set in place to avoid the shifting flow of IUU fishing products being landed in ports especially when the

regions need to play a fundamental role in harmonising port state measures among members across the region (Miller and Sumaila, 2016 ).

On the 5th of June 2016 the 1st international legally binding agreement specifically targeting IUU Fishing was entered into force for international members to enter and agree with the conditions set in place. A major focus was on the Oceania Pacific countries, as most small island nations have a vast EEZ and are vulnerable to Illegal Unreported and Unregulated fishing practices. (FAO, 2024).

Studies have shown that the implementation of the FAO Port State Measures Agreement (PSMA) should incur benefits that could prevent fish caught from IUU fishing activities from reaching national and international markets. (FAO, Illegal, unreported and unregulated fishing, 2016) Many countries have decided to prohibit trade with countries that do not have port state measures set in place (FAO, 2024).

#### *2.5.6 Fiji's commitment to FAO port states measures*

In February 2019, Fiji committed to complying with international legal standards to combat IUU Fishing practices (Department of Fisheries, 2022). Fiji believes that this FAO Port State Measures Agreement will give significance in allowing Fiji's obligation to control its port from any IUU fishing practices. Offshore Fisheries Management Act 2012 Part 7 Section 76-78 is the provision that supports Fiji to control its designated fish ports from any IUU fishing activities. Driven by other Pacific Members, such as Palau, Tonga, and Vanuatu, Fiji has remained committed to meeting international requirements for dealing with the use and entry of ports through the UN FAO Port State Measures Agreement (PSMA) (FAO, 2024).

Signing this PSMA will fill the gap in international governance by setting agreed standards for port state measures around the region and the world. Strengthening the capacity and cooperation among port states will ensure the sustainability of marine resources (FAO, 2016). As part of the control measures for eliminating IUU fishing practices, through these harmonised port state measures, member states may use and share information derived from catch certificates to improve the verification of imports and risk analysis.

A system of mutual assistance allows Member States to alert each other to suspected transactions of IUU fishing products and can be used by the Commission to send alerts to all Member States. The Commission cooperates with the European Fisheries Control Agency (EFCA) to encourage a harmonised risk-analysis system across Member States, which would support a more cost-effective approach to the control of catch certificates and reduce the burden on Member States (EJF et al., 2016).

## **2.6 Fiji catch certificates to EU market**

Illegal, Unreported, and Unregulated (IUU) fishing practices have been a significant issue for the seafood market. IUU-caught products enter the global trade chain and reach overseas markets, disturbing the local food supply. Illegal and unreported catches represented 20-32 % of the volume of wild-caught seafood imports in the United States and 24-36 % in Japan (Pramod et al., 2014). In the European Union, IUU-caught products imported annually are considered to reach approximately 500,000 tonnes, at a value of €1.1 billion in 2015 (Miller and Sumaila, 2016).

To eliminate or reduce the impact of IUU fishing practices on overseas markets such as the EU market, EU Imported fishery products must be accompanied by a Catch Certificate in line with the Illegal, Unreported, and Unregulated (IUU) Fishing Regulation (European Commission, 2019).

The Fiji EU Catch Certificate (FJ EU CC) is a crucial requirement for both EU-approved fishing vessels and fish processing establishments. When exporting fish from an EU-approved establishment, it is important to understand that EU export fish and fishery products are sourced from an EU-established fishery, such as an EU-established Fiji fishing longline vessel and an approved fish processing establishment, and only an FJ/EU Catch Certificate must accompany the export (Council of the European Union, 2008)

For Fish and Fishery Products to be imported into the EU, the product must meet the EU sanitary requirements and be accompanied by a Health Certificate. The Health Certificate must be verified, validated, and issued by a competent authority from the list of approved countries and an approved establishment of fishery vessels (Council of the European Union, 2008). A National competent authority is a statutory body responsible for maintaining an updated list of approved establishments and ensuring credible inspection and control throughout the production supply chain, ultimately allowing a country to be eligible and authorised to export the product to the EU market (Council of the European Union, 2008).

#### *2.6.1 Integrated approach with electronic log sheets directly embedded into the processing facility database*

Data-driven insights play a pivotal role in informed decision-making in the tuna industry. By accurately analysing digital data, companies gain valuable insights that guide their strategic adaptations (Council of the European Union, 2008). Real-time information enables timely adjustments to ensure safety, quality, and competitiveness. Embracing digitalisation benefits both industry workers and EU consumers, reinforcing their commitment to responsible practices in the ever-evolving tuna market (FAO, 2023).

E-LOGS, known as electronic logbooks, are computer programs/software placed or installed on fishing vessels that allow the entry and submission of daily fishing logs. These are operated by the fishing vessel captain or any vessel developing electronic logbooks (E-LOGS) onboard tuna fishing vessels in the Pacific region has been notable in recent years.

Currently, Initiatives led by Pacific Island countries in collaboration with regional organisations, such as the Secretariat of the Pacific Community (SPC) and the Pacific Forum Fisheries Agency (FFA), have spearheaded the adoption of E-LOGS. This is currently a pilot project facilitated and funded by the Secretariat of the Pacific Community (SPC) and Pacific Fisheries Forum Agencies (FFA).

These pilot programs have been crucial in testing the feasibility and effectiveness of this technology, allowing for real-time data collection and improved monitoring of fishing activities. Studies indicate that E-LOGS connect to the cloud-based system TUFMAN 2, a cloud-based web database system developed for the Pacific, which is currently being provided with the sense of managing tuna fishery datasets and also receives data (automatically) to an integrated database system that can be accessed by vessel agents, operators, government agencies, and processing industries.

Ultimately, the research project is venturing towards successfully making this transition. The system provides a leeway for or a window for traceability and transparency of accurately recording data effectively and efficiently from fishing vessels, as it is directly linked to the processing companies database.

Tuna fishing vessel owners, operators, and processing companies have increasingly embraced E-LOGS technology because of its potential benefits in streamlining reporting processes, enhancing compliance with regulations, and improving data accuracy. The Fiji Tuna Fisheries processing industry will effectively engage in this pilot project (Fiji Fishing Industry

Association, WWF-Pacific, 2021). Once this is rolled out, the Ministry of Fisheries, government agencies, fishing companies, fishing industry associations, and civil society organisations will collaborate closely to address technical challenges and regulatory requirements when installing e-LOGS in fishing vessels (WWF, 2020).

Fiji is currently developing strategies for capacity-building efforts that focus on training fishermen and crew members in e-LOGS usage and associated technology. These efforts collectively signify a significant step forward in modernising fisheries management practices in the Pacific region (European Commission, 2024). Once these e-log systems have been installed on all vessels, this will be a big step toward the digitalisation of processing reports by integrating e-logs with onshore applications, where Fiji will improve accuracy, transparency, and sustainability (FFA, 2015). In this context, the implementation of e-LOGS directly supports compliance with the EU IUU Regulation (Council Regulation (EC) No. 1005/2008) by strengthening traceability and monitoring of fishing operations. Vessel crews are required to ensure that all catch data and related fishing activities are accurately recorded at sea to support standardised reporting and oversight mechanisms. This approach reflects progress in establishing international compliance standards and bridging the gaps identified in Fiji's fisheries management framework.

When the Ministry of Fisheries makes a procedural intervention to verify and validate Fiji/EU Catch Certificates to the EU Market (FJ/EUCC), they follow a standard operating procedure (Appendix 1) to consolidate data captured by the processing industries for easy access and validation of data with the current paper-based reporting system in place. Fiji is doing its best to maintain a transparent reporting system that sets a path integrated with regional and international market standards.

#### *2.6.2 Digitalisation reporting system support for Sustainable Development Goal 14-Life below water.*

One of the key measures is to prove the legality of the fish when landed and to follow a consistent process of fast and efficient EUFCC validation. This can only be proven vital when using a digital certification system. The implementation of Fiji Catch certificates is a great measure for enhancing transparency and compliance throughout the supply chain. These Fiji Certificates accompany fishery products imported into the European Union (EU) and provide crucial information about the origin of the fish caught from Fiji-flagged vessels and the Fiji EEZ, proving the legality and sustainability of the catch. Catch certificates play a vital role in preventing illegal, unreported, and unregulated (IUU) fishing practices by ensuring traceability and transparency.

Sustainable Development Goal 14 focuses on the conservation, management, and sustainable use of marine resources (FAO, 2018). The digitalisation of tuna fish catch processors reporting systems supports sustainable fisheries management by creating a traceability platform to promote transparency in seafood supply chains, thus discouraging illegal fishing practices (FAO, 2018).

By embracing digital technology, the process becomes more efficient, convenient and transparent. This digital transformation enables robust verification and validation procedures, ensures compliance with regulations, and facilitates smoother interactions with competent authorities. Ultimately, it streamlines the certification process, benefiting both stakeholders and the Chain of Custody of the tuna catch supply chain (WWF, 2020). Digital technologies serve as a catalyst in advancing SDG 14 by providing crucial data, fostering global collaboration, promoting sustainable fishing practices, and raising awareness of the importance of managing and sustainably protecting our oceanic marine resources. (FAO, 2018).

### 3 METHODOLOGY

This chapter is structured to ensure a comprehensive analysis of the transition to digitalised reporting systems within Fiji's tuna processing industry. The research commenced with a literature review, which was critical in understanding existing knowledge and identifying gaps in the current understanding of digitalisation in the industry.

The literature review aimed to consolidate the existing knowledge on digitalised reporting systems within the tuna processing industry. The review involved an extensive search of academic databases, such as Google Scholar, and various institutional websites, focusing on scholarly articles that addressed the significance of such systems.

Following the literature review, a SWOT analysis was employed to critically assess the viability of the proposed digitalised reporting system. This analysis provided a structured approach to identify the system's strengths, weaknesses, opportunities, and threats, especially in comparison to conventional paper-based methods. The SWOT analysis facilitated a comprehensive evaluation of the internal and external factors that could influence the successful implementation of a digitalised system within Fiji's tuna processing industry.

The research methodology also incorporated expert interviews and questionnaires, which were instrumental in capturing the perspectives of various stakeholders directly involved in Fiji's fishing industry. Three prominent Fijian processing and storage companies were questioned and interviewed using a series of questionnaires. The data obtained were subsequently recorded and examined in the results section and are displayed in Appendix 3. In addition, interviews were conducted to discuss the significance of implementing digital systems in ports. Such systems could potentially enhance port control operations and support strategies aimed at promoting digitalisation in ports, which, in turn, may contribute significantly to the eradication and prevention of Illegal, Unreported, and Unregulated (IUU) fishing activities. This questionnaire included fishing companies, industry associations, processing companies, port authorities, and regulatory bodies. Engagement with these stakeholders through interviews and surveys was designed to gather in-depth insights into the practical challenges and benefits of transitioning to a digitalised reporting system. The results of these engagements, which are visually represented in the figures of this study, provide empirical evidence to support the findings and recommendations.

Overall, the methodology adopted for this study ensured a robust and holistic analysis of the importance and implications of implementing an integrated digitalised reporting system for tuna processors in Fiji. The combination of a literature review, SWOT analysis, and stakeholder engagement offered a well-rounded perspective on the potential transition from paper-based to digitalised systems.

## 4 RESULTS

After the literature review, a SWOT analysis was conducted to critically evaluate the viability of the proposed digital-reporting system. This analysis provided a systematic framework for identifying the strengths, weaknesses, opportunities, and threats related to digitalised systems, particularly in contrast to traditional paper-based methods, and offered a detailed assessment of the factors that could influence the adoption of digital reporting within Fiji's tuna industry.

In addition to the literature review and SWOT analysis, the methodology incorporated expert interviews and questionnaires to capture the perspectives of key stakeholders actively involved in Fiji's fishing sector, including fishers and the three well-established processing companies. Engaging with these stakeholders generated practical insights into the challenges and benefits of transitioning to a digitalised reporting system. The data collected through these interactions, illustrated in the study's figures, provided realistic support for the study's conclusions and recommendations. Overall, the combined use of the literature review, SWOT analysis, and stakeholder engagement ensured a comprehensive examination of the implications of moving from paper-based to digital reporting systems for tuna processors in Fiji, establishing a strong foundation for the subsequent chapters of the study.

### 4.1 The evolution of Fiji's tuna sector

Fiji's tuna sector has undergone significant changes over the years. Initially, foreign fishing vessels dominated the fishing zone during the 1950s. However, local participation began in the mid-1970s, primarily focusing on pole-and-lining. In subsequent decades, Taiwanese and Korean longline fishing vessels established operations in Fijian waters, making longlining the predominant fishing method. Meanwhile, artisanal trolling fishers targeted fish aggregating devices (FADs) for the local market. The fleet structure included licenced longline vessels, unlicensed Fiji-flagged longline vessels, and a small number of pole-and-line vessels. Challenges such as incomplete data coverage and underreporting of non-target species persist. Despite these challenges, Fiji's domestic tuna industry contributes significantly to the economy, with high-value tuna species destined for markets in Japan and the United States. Efforts are ongoing to enhance sustainability and explore value-adding opportunities.

Fiji's fisheries sector, particularly its tuna industry, is the backbone of the nation. Coastal fisheries support local food consumption, generate income for coastal households, and contribute to cultural practices in the region. Additionally, they attract tourists and stimulate economic activity and employment opportunities in the tourism sector. Offshore fisheries, especially the tuna industry, play an important role in Fiji's economy by providing employment, income, and access to food sources. With a diverse range of tuna species, including yellowfin tuna, bigeye tuna, albacore tuna, and skipjack tuna, Fiji's offshore fisheries contribute significantly to GDP and total export earnings. The tuna processing industry in Fiji involves fishing, landing, processing, and exporting, with modern facilities that adhere to international standards. Thousands of Fijians are employed in this sector. Despite challenges such as market dynamics and environmental conditions, Fiji's tuna sector continues to evolve, maintaining sustainable practices and economic growth. As eluded earlier, there have been vast challenges over the years with the emerging tuna industry.

Trial and error marked Fiji's journey towards a manual paper-based process reporting system from when Fiji was relisted to the EU market list, with non-compliance risks such as receiving a yellow card from the EU IUU in 2012, potentially leading to market suspension. One of the main reasons for the yellow card is inaccurate data recording and lack of transparency by the processing industries to compete for authority validating the catch with the support of

inaccurate data given by the processing facility. The Ministry of Fiji Fisheries and Health Competent Authority stepped in to assist the processing industries with their reporting systems, especially by providing legitimate data reporting systems incorporating health measures, quality control measures, and traceability approaches to the EU market. Fiji's tuna processing industry faces challenges, but continues to thrive because of innovation, strategic partnerships, and a commitment to sustainability (Department of Fisheries, 2022).

The aim is to maintain its position as a leading tuna processing hub in the Pacific region. However, there is a catch: catch certificates must prove the legality of the catch (Economy, 2020).

These certificates play a crucial role in accessing the European Union (EU) market. They serve as verification that seafood exports from Fiji originate from legal and sustainable sources. Without valid catch certificates, Fiji risks losing its market position. Fiji is determined to avoid reverting to the yellow card stage, having experienced significant losses due to market standards not being met in the past. Compliance with specific standards is essential to maintain market access.

Therefore, Fiji is working on training and certification efforts to ensure compliance. With that effort comes the reading ability effort of accurately recording the processing reports that support the review process of verifying accurate and correct data for the EU Market.

The economic impact is significant, with close to 200 million Fiji dollars in annual earnings and over 15,677 people directly employed in the sector (Economy, 2020). However, it is not just about money; it is about responsible fishing practices and preserving marine resources. Fiji must address any shortcomings in processing clear reports and catch certificates to continue swimming in the EU market waters. The processing reporting system is traditionally paper-based and manages fish processing details which significantly paves and creates an atmosphere of securing fish-processed or non-processed products to meet EU market standards (EUMOFA, 2023). For the past 11 years, ever since Fiji was yellow-carded, Fiji has been able to make use of improvising efforts to maintain and ensure compliance with EU market standards. Fiji's processing reporting system is paper-based, and this system tries to pave its way in creating an atmosphere of securing its fish-processed or non-processed products to meet EU market standards.

Data verification is crucial for ensuring the accuracy and legitimacy of reported information. This process involves cross-checking data from the Ministry of Fisheries or vetting by third parties to prevent potential traceability fraud. This includes mass balance calculations, validation checks, and monitoring through vessel monitoring systems (VMS) or automatic identification systems (AIS). Additionally, health code certificates and chain-of-custody compliance certificates contribute to verifying legal fishing practices.

In the past 8 years, there have been significant processes in the primitive changes made to pave an important technical reporting system administered by the processing industry, supported and regulated by the Ministry of Fisheries. The Ministry of Fisheries has created a CDS standard operating procedure (SOP) that supports regulatory measures to ensure that the industry maintains its connectivity to the EU and other international markets.

#### **4.2 Processing reports are a vital part of FJ/EU catch certificates.**

The significance of Fiji's processing facility and storage infrastructure cannot be overstated, especially considering the lessons learned from past challenges, such as Fiji's yellow card status, which led to disruptions and a decline in market standards (Council of the European Union, 2008).

Proper handling and storage of catches destined for export, whether to the EU or non-EU countries, are paramount for maintaining quality and compliance with international regulations (Ministry of Health, 2011).

Following landing, fish are carefully stored in EU-listed storage facilities and undergo blast freezing to preserve freshness and quality during transportation. Shipments are calculated based on container units, with 40 ft containers accommodating a maximum load of 25 tonnes and 20 ft containers supporting approximately 16 tonnes for shipment to the EU market. Despite the potential capacity of a 40 ft container to hold close to 40 tonnes, adherence to the national road limit of 25 tonnes is mandatory.

With a minimum shelf-life requirement of 18 months for frozen tuna before export, the processing facility ensures that products meet stringent quality standards. Unloading procedures, particularly for larger catches, typically span approximately 3-5 days, allowing ample time for sorting different species to ensure accuracy and compliance with export documentation (Fisheries, 2021).

Fish Reporting is paper-based and manually entered in Excel spreadsheets after the catch is landed and weighed at the port. It is important that the levels of residues found in food are safe for consumers and are kept as low as possible. Before fish and fishery products reach the EU market, the European Commission establishes a common assessment to ensure that fish and fishery products meet safe residue levels (Ministry of Health, 2011).

The European Union has strict and complex regulations on Maximum Residue Levels (MRL) for fish and fishery products. The Maximum Residue Level (MRL) is a crucial concept and a common assessment used to ensure food safety within the European Union (EU) (Ministry of Health, 2011).

These protocols and practices underscore the processing companies' commitment to maintaining the integrity of Fiji's seafood exports and upholding market standards by improving the processing and reporting systems.

Having stated that, normally it takes 3-5 working days for the landing summary to be tabulated for the validating authority, such as the Ministry of Fisheries, to conduct verification and validation of the Catch Certificate accompanied by the consignment for the EU Market.

Given these processes, it is beneficial for the industry to have a minimum of 3-5 working days to finalise the Landing Summary (Fiji Fishing Industry Association (FFIA), WWF-Pacific (WWF), 2021). This is a significant setback, as data often contain errors with many discrepancies, causing setbacks to the timespan of the self-life of the product and market arrangements set in place.

Ensuring compliance within the supply chain traceability system is paramount, emphasising the importance of accurate processing data reported by the fishing industry to ensure consistency with the receiving catch.

#### 4.2.1 *Discrepancies, errors, and misreporting of processed catch*

Additionally, errors may accumulate, and obtaining crew members on board vessels for fishing trips can be challenging, especially after long periods of inactivity, leading to mix-ups in species identification. Most crew and fish processing workers are new and have a limited understanding of species identification.

There is a need for training aligned with specific cases to understand the regulatory and competent authorities to navigate these challenges and ensure accurate processing reports following the formulation of the landing summary.

Processing reports are crucial components of catch certificates and play a pivotal role in ensuring seafood product traceability and legality (Gillett and Cartwright, 2012). Processing reports provide detailed documentation of the processing activities undergone by the catch from its initial landing to its final exportation.

By carefully recording each step of the processing chain, including cleaning, filleting, freezing, and packaging, processing reports offer transparency and accountability in the seafood supply chain (Fiji Fishing Industry Association (FFIA), WWF-Pacific (WWF), 2021).

These manual paper-based processing reports serve as essential tools for verifying compliance with regulatory standards, certifying the origin and handling of products, and detecting any irregularities or discrepancies that may arise.

### 4.3 **Current export processing industries with graphs to the EU market from 2018 to 2023**

This study introduces three processing companies that operated in Fiji during this period. They contribute to sustainable practices, adhere to international standards, and play crucial roles in meeting EU market requirements.

#### 4.3.1 *Golden Ocean*

Golden Ocean Fish Processing Ltd., operating in Fiji since 2000, plays a significant role in the Tuna Fishing Industry. Their main business involves Tuna Long-line fishing, processing, and exporting of various deep-sea fish species, including yellowfin tuna, big eye tuna, albacore tuna, marlin, swordfish, mahimahi, wahoo, opah, escolar, sailfish, and spearfish (Fiji Fishing Industry Association (FFIA), WWF-Pacific (WWF), 2021). Although specific details about Golden Ocean's catch reporting accuracy are not directly available in the sources, they must maintain precise records. As a responsible fishing company, the company adheres to the best practices for accurately reporting catch data.

#### 4.3.2 *Solander Pacific Fishing Company*

Solander (Pacific) Ltd: Established in 1987, Solander (Pacific) Ltd. is one of Fiji's longest-standing fishing companies. It became a registered Fijian company in 1988 (Fiji Fishing Industry Association (FFIA), WWF-Pacific (WWF), 2021). Operating from Suva, Solander owns a fleet of locally manned longline vessels. These vessels play a crucial role in Fiji's seafood exports, ensuring that they come from legal and sustainable sources. Solander directly contributes approximately FJD 15 million to the economy annually and employs around 300 people, with ongoing training for skippers, crew, and engineers (WWF, 2020). All vessels supplying Solander, whether owned by the company or privately owned, are Fiji-flagged and operate under the licences and jurisdiction of the Fijian Ministry of Fisheries (MOF) (Department of Fisheries 2022). The company's commitment to sustainable practices aligns

with international standards, including those set by the Western and Central Pacific Fisheries Commission (WCPFC) and the United Nations Convention on the Law of the Sea (UNCLOS)

### 4.3.3 Pacific Fishing Company Pte Ltd PAFCO

Pacific Fishing Company Pte Limited (PAFCO), located in the picturesque old capital of Levuka on the island of Ovalau in Fiji, is committed to maintaining high standards of accountability and transparency in its operations with a well-renowned cannery, where the finest quality tuna catch is meticulously sorted, graded, processed, and packed (WWF, 2020).

These companies collectively contribute to Fiji’s tuna fishing processing industry, ensuring sustainable practices and meeting EU international market standards. Each company has an EU-established processing facility, an EU-established storage facility, and an EU-established registered Fiji Offshore Tuna Fishing Vessel. Based on the three EU-established processing and storage facilities, the SWOT analysis data captured were able to provide the data below, clearly depicting the three processing companies signifying the rate at which the company has exported to the EU market (Figure 8).

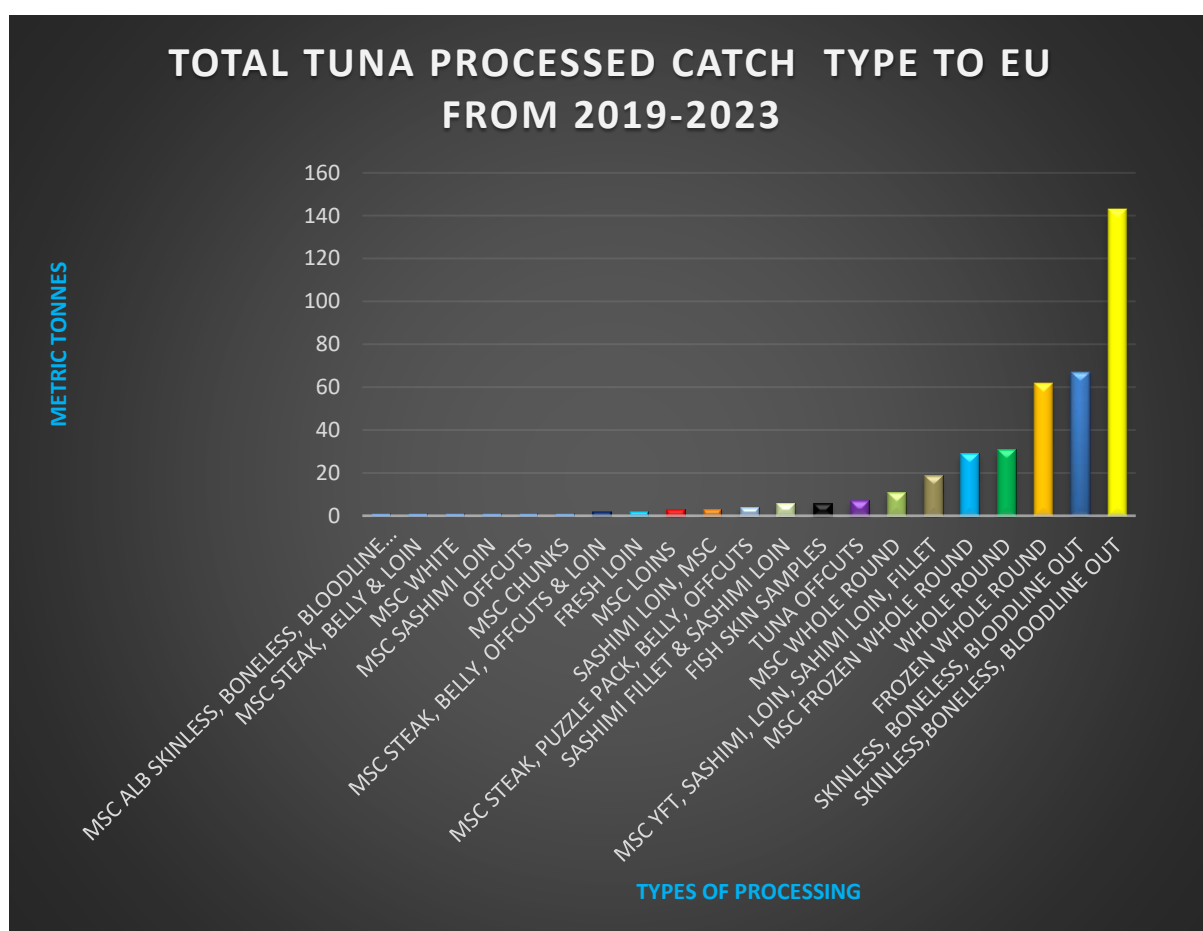


Figure 6. Total Tuna Catch Processed Type from 2018-2023 to the EU Market

Based on the questionnaire in Appendix 3, the three EU-established processing companies provided sufficient measures and a well-established systematic approach that enabled the effort to provide the highest peak for the three processing companies.

Golden Ocean Fish Limited, a prominent player in Fiji’s tuna export market, has achieved remarkable success in recent years. The bar graph in Figure 9 depicts the metric tonnes of tuna exported to the EU market from 2019 to 2023 and clearly showcases their dominance.

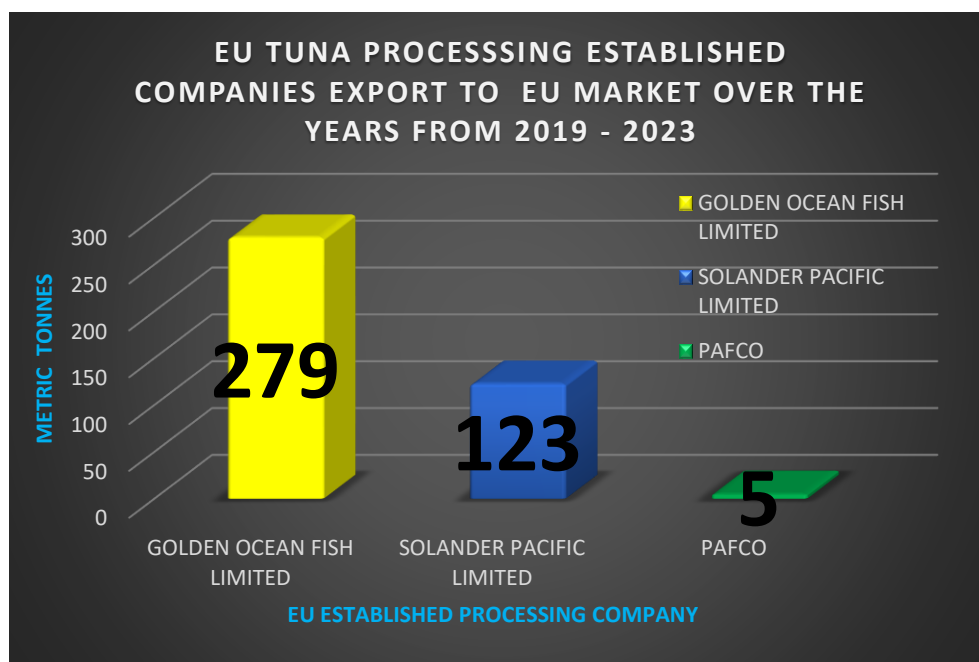


Figure 7. Processed Fiji tuna export values to the EU market (2019-2023) data by established companies.

According to the questionnaire results, three strengths were identified for the company's process progress throughout the years. First, Golden Ocean's ability to secure a high tonnage of tuna ensures a steady supply. Buyers appreciate reliability, and Golden Ocean has consistently delivered it. Second, their consistent supply to the EU market has fostered trust and repeat business. Third, the company's strategic focus on fleet optimisation—maintaining one of the youngest average fleets—has allowed it to reduce emissions, comply with regulations, and enhance efficiency.

Golden Ocean's success is not just about numbers; it is about market dominance, reliability, and commitment to quality. Their ascent to the top of the tuna export industry is a testament to their strategic vision and operational excellence in the field.

Figure 10 visually represents the quantities of various fish species processed for export to the European Union (EU) market. The x-axis spans 0–300 metric tonnes, whereas the y-axis lists different fish species. Notably, Albacore Tuna stands out significantly, indicating a substantial quantity being processed during this period. Other species show minimal or negligible quantities. This graph underscores the importance of Albacore Tuna as an EU-bound fish export and highlights the need for sustainable practices to meet market demands which has maintained a sustainable catch per yield, as shown in Figure 4, the self-sufficiency rate for Tuna within the Oceania Pacific region.

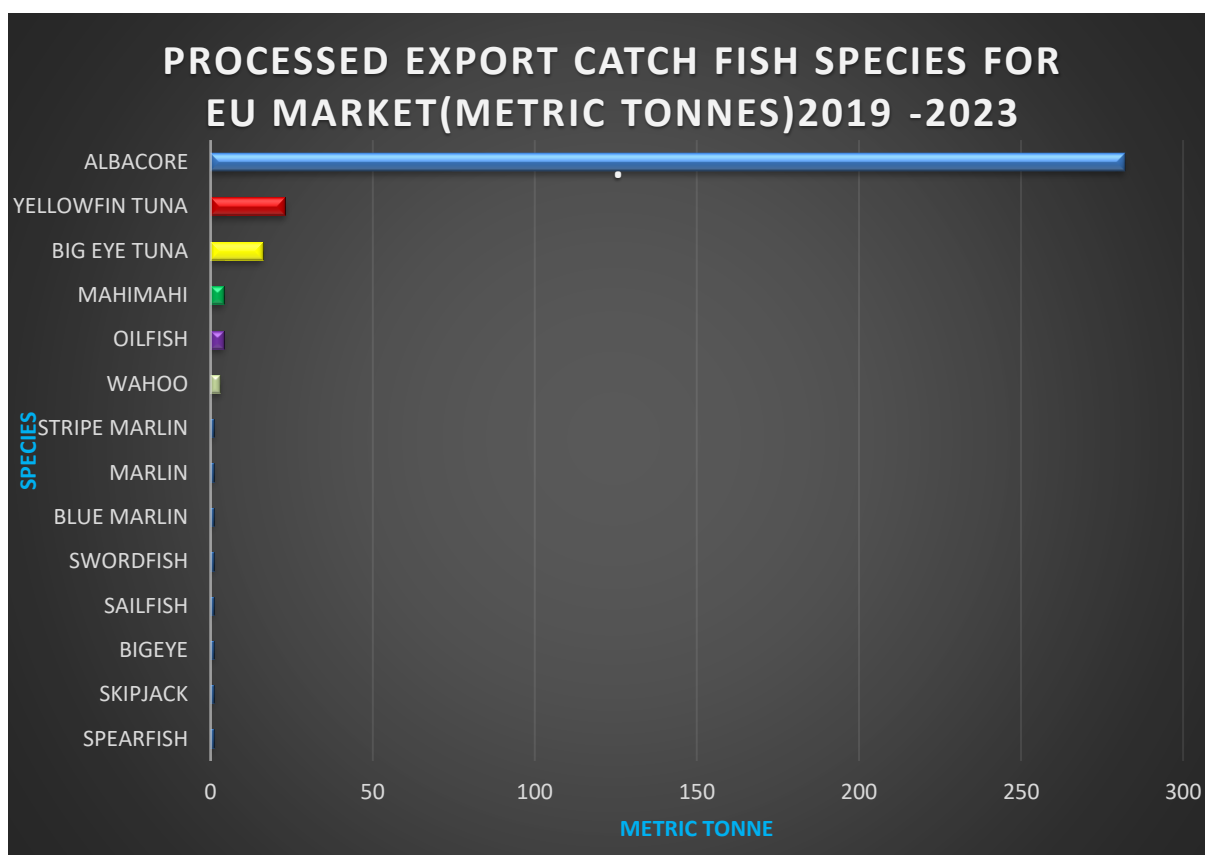


Figure 8. Processed catch fish species for EU market (metric tonnes) 2019-2023.

As depicted above, frozen albacore is in high demand in the EU market. Initially, the European Union (EU) market had specific preferences and requirements for tuna exports. Albacore tuna, also known as “white tuna”, is often favoured over yellowfin and bigeye tuna for several reasons. First, albacore has a mild flavour and firm texture, making it highly valued in European cuisines. Additionally, albacore generally contains lower mercury levels, aligning with EU regulations that prioritise food safety. Fiji’s focus on albacore production stems from its abundant catch using the longline fishing method. This fishing method is a sustainable and efficient technique that contributes significantly to Fiji’s economy and meets both market demand and economic considerations.

In Fiji, a fleet of longline fishing vessels has been authorised by the European Union (EU). These vessels are flagged and registered in Fiji. Fiji’s Competent Authorities to the EU market, such as the Ministry of Fisheries and the Ministry of Health, shall ensure that they play a crucial role in ensuring the fishing vessel’s seaworthiness and compliance. Their responsibilities include verifying that these vessels are not involved in any form of Illegal, Unreported, and Unregulated (IUU) fishing activities during their service periods when fishing EU tuna for export. The vessels operate within Fiji’s Exclusive Economic Zone (EEZ) and beyond its national jurisdiction. Thorough inspections are conducted before the vessels unload the catch for processing to the EU market to maintain their adherence to regulations and prevent any IUU fishing practices. This collaborative effort aims to sustainably manage tuna resources and maintain an ecological balance in the region.

Figure 11 displays the catch amounts for the different Fiji-flagged Tuna Longline fishing vessels. Each Fiji Tuna fishing vessel is represented by a coloured bar. The y-axis lists the tuna fishing vessel names, including Winfull1, Solander Kariqa, Winfull168, and others. The x-axis represents the catch in metric tonnes (ranging from 0 to 900). Notably, Tuna Fishing vessels Winfull1 and Winfull 2 had the highest catch, nearly reaching the 900 metric tonne mark. Other vessels, such as Tuna Longline Fishing vessels Solander Kariqa and Winfull168, had significantly lower catches.

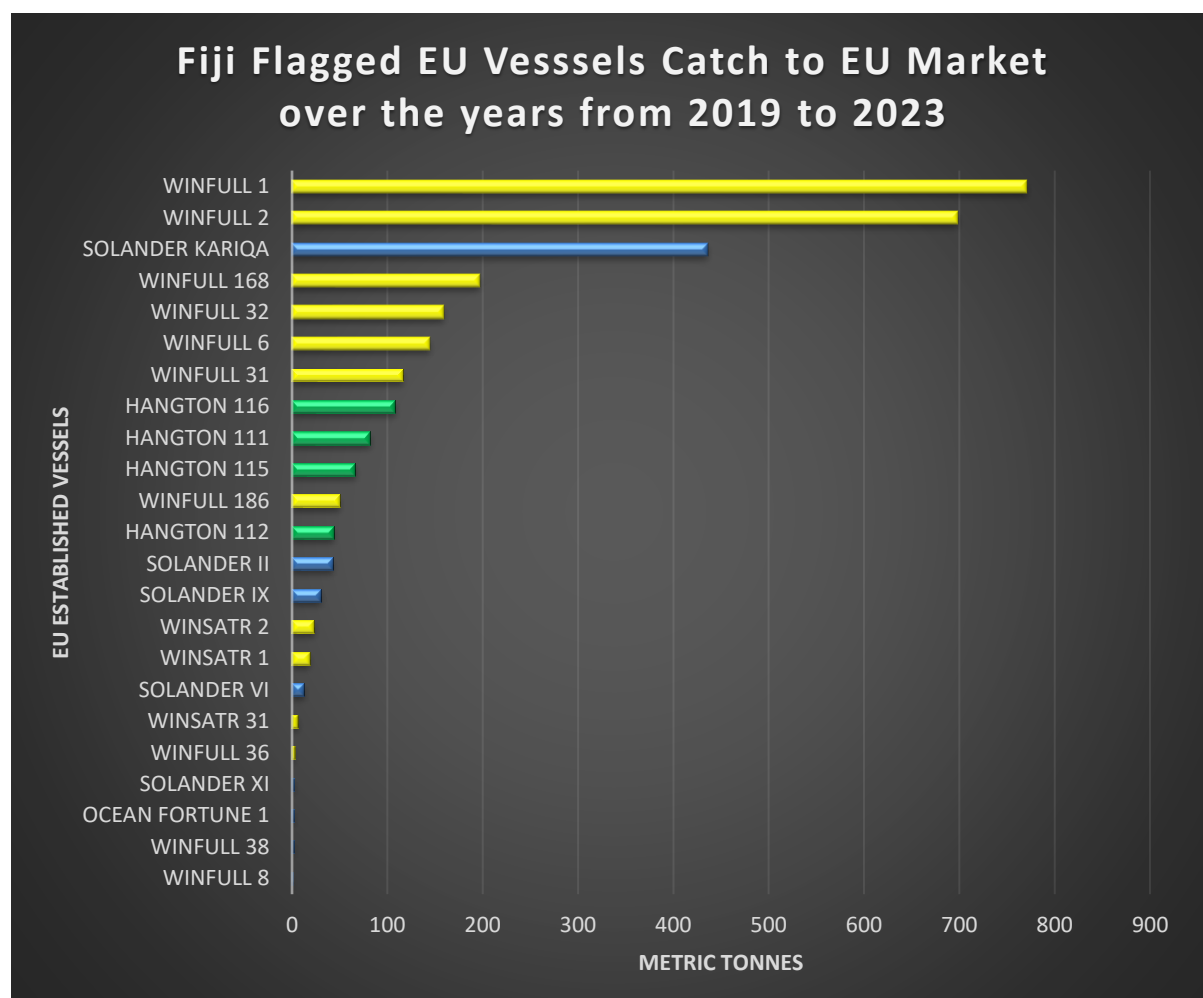


Figure 9. Fiji Flagged EU established vessels showing the catch status of processed export weight to EU market from 2018 to 2023.

The yellow-bar fishing vessels operated by Golden Ocean contribute significantly to the EU market. Examples include EU-established fishing vessels, such as Winful 1, Winful 2, and Ocean Fortune.

Owned by the Solander Pacific Fishing Company, blue fishing vessels also play a notable role in the EU market. Notable examples include Solander Karika and Solander IX.

Finally, the green fishing vessel owned by an EU-based fishing company has a unique supply arrangement. Unlike other vessels, it does not directly sell its catch. Instead, it supplies or sells fish from its EU-established fishing vessels to the Pacific Fishing Company (PAFCO) in Fiji. This arrangement ensures that PAFCO receives fish from EU-established vessels, contributing to the overall seafood market.

In summary, figure 11 highlights the diverse ownership and intricate supply chains that sustain the EU seafood industry. This is further referenced in Appendix 2, which shows all the EU-established freezer fishing vessels, storage facilities, and processing facilities.

#### **4.4 Fiji's response to EU's yellow card**

In response to the yellow card issued by the European Union (EU) in 2012 for non-compliance with international fisheries laws and the EU IUU Regulation, Fiji took significant steps to improve its domestic fisheries management and legislation. These measures included the Offshore Fisheries Management Act 2012, which served as a legal cornerstone for managing and conserving offshore fisheries. The key provisions of this Act include licencing, authorisation, and conservation measures. Additionally, Fiji implemented the Offshore Fisheries Management Regulation 2014, which provides detailed rules and procedures, including catch certificates and licencing. Notably, Regulation 14 of the Offshore Fisheries Management Regulation 2014 introduced the Fiji Catch Certificate, ensuring traceability and accountability for catches along the supply chain from the point of origin. These legislative reforms aim to secure Fiji's place in the global seafood market while safeguarding marine ecosystems.

#### **4.5 The need to digitalise reporting and certifications. SWOT analysis outcomes from three well-established EU export processing companies.**

The SWOT analysis of the three processing companies established in the EU indicates that the existing paper-based method for acquiring a Fiji-EU Catch Certificate (FJ EU CC) is inefficient. The primary issue is the delay in reporting; the landing summary is typically submitted 3-5 days post-catch landing at the port. This lag hinders the timely issuance of the required catch certificates that should accompany shipments to the EU market. Often, the validated and verified FJ/EU Catch certificate creates chaos in the EU market because it all comes down to the processors providing a delay reporting system when it comes to meeting market deadlines. Streamlining and expediting the verification process would significantly improve efficiency and ensure timely compliance with certification requirements; only a digitalised system will improve the turnaround timeframe.

Figure 12 presents a SWOT analysis that aims to guide digital transformation by capitalising on strengths and taking advantage of emerging opportunities. Feedback from the established EU processing companies suggests a consensus on the necessity of change and willingness to collaborate. The goal is to enhance reporting systems, with digitalisation expected to bolster their capabilities and facilitate the adoption of innovative technologies. However, based on the analysis, there is resistance to change among employees when adopting digital tools.

Overcoming these internal weaknesses is crucial for a successful digital transformation. There is good evidence that when we address and explore the transition as we go along, these weaknesses and threats will enable EU-established processing companies to strategically navigate the path toward digitalisation for catch process reporting systems and catch certification.



Figure 10. SWOT Analysis of the three EU-established processing companies on the current paper-based processors reporting system.

With the above research findings on the current reporting process, this study significantly shows the need to transition from a paper-based reporting system to digitalisation in Fiji's tuna fish processing industry, which promises significant improvements. Several key changes are expected with the adoption of digital platforms. First, the turnaround time for producing catch certificates, such as the Fiji-EU Catch Certificate (FJ EU CC), will be greatly reduced. Real-time data entry, validation, and processing will replace manual paperwork, ensuring the faster issuance of certificates.

Simultaneously, this research paper was also able to conduct a SWOT analysis of the three EU established processing companies based on the need for this transition to take place. **Error! Reference source not found.**

According to the analyses, the digitalisation processing reporting system will enhance accuracy and consistency by minimising human errors and maintaining standardised formats. Improved traceability from catch to export will strengthen market confidence and support sustainable fishing practices.

There are weaknesses and threats; however, the relevant government agencies, processing companies, and other stakeholder agencies can address these weaknesses and threats as we need to acknowledge this, and we will need to invest in making a change and will be able to manage the system in place. It is always best to maintain an open dialogue for training, capacity building, and communication. Staying agile, cooperating, and keeping informed will help us counter digital competitors, cyber-crime, and digital risks.



Figure 11. SWOT Analysis of the three EU-established processing companies for a digitalised processors reporting system.

Moreover, efficient communication channels will facilitate seamless interactions among fishing vessels, processing establishments, and regulatory bodies. Additional benefits include cost savings, resource optimisation, and reduced environmental impact due to decreased paper usage.

However, stakeholders are willing to adapt to new technologies, and balancing security and accessibility remains crucial. Overall, digitalisation holds immense potential for streamlining processes and promoting efficiency in the tuna export industry (EUMOFA E. M., 2021).

## 5 DISCUSSION

### 5.1 Fiji's EU export volume and value from the three main EU established processing facilities.

The export volume and value of Fiji's tuna to the European Union (EU) provide a significant economic pillar for the nation, reflecting the health and viability of its fisheries sector. This discussion chapter provides insights into the dynamics of Fiji's tuna exports, examining the performance and contributions of the three main EU-established processing facilities. These facilities are important for processing and preparing tuna for the EU market and serve as indicators of the industry's adherence to international standards and regulations.

The analysis and results provided an examination of export trends, market orientation, vessels, and the impact of regulatory compliance on market access for the three well-established processing companies. This chapter explores how the transition to digitalised reporting systems can potentially offer a path to enhanced sustainability and profitability of the Fiji tuna industry. Furthermore, this discussion addresses the challenges faced by the industry, including the implications of past warnings, such as the yellow card, and the ongoing efforts to fortify Fiji's reputation as a reliable and responsible exporter.

By scrutinising the export volume and value from these facilities, we aim to provide a comprehensive overview of the current state of Fiji's tuna industry and its prospects in the competitive EU market (Figure 14). Let us now try to explore more on the weight and value of EU Processed Catch statutes from when the yellow card was issued and when the yellow card was uplifted till 2014, at which there was an improvement and a rise in the export to the EU market. Over the years, Fiji has been able to secure three consistent EU markets, and through this, there were significant adaptive measures analysed by a questionnaire that depicts the trend below.

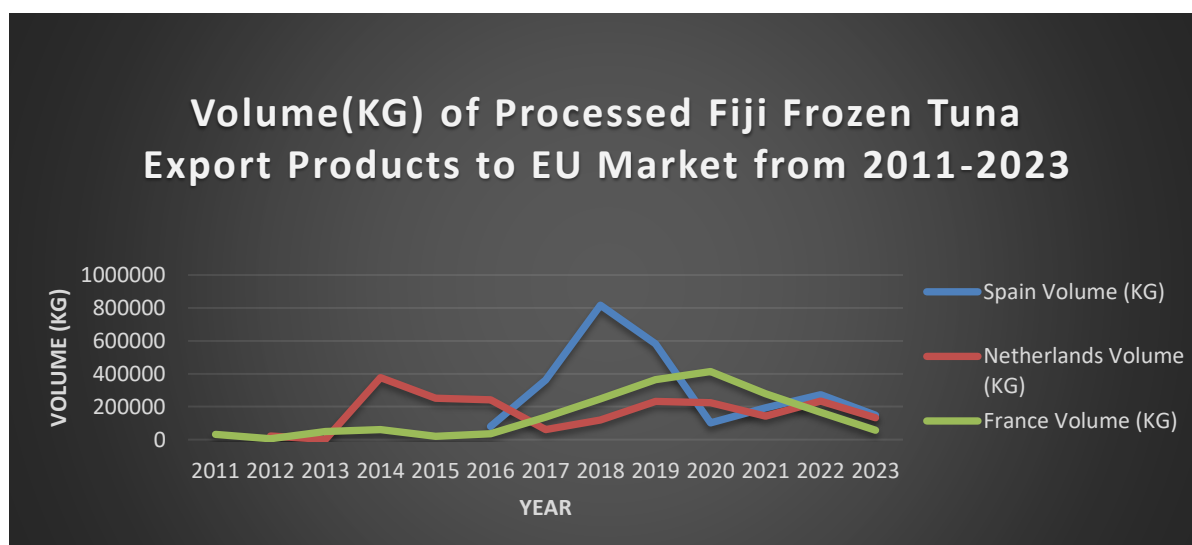


Figure 12. Volume (kg) of processed Fiji frozen tuna export products to EU market from 2011-2023.

Figure 14 shows that the EU yellow card issued in 2012 and its subsequent upliftment by 2015 for Fiji significantly impacted Fiji's relationship with the European Union (EU), particularly in terms of fisheries and trade.

The graph above illustrates the volume of processed Fiji Tuna export fish products to the EU market from 2011 to 2023. Notably, there was a significant decrease in exports to Spain, the Netherlands, and France during 2022-2023. Urgent action is required to address this decline and prevent further setbacks. Implementing a digitalised processing and reporting system would enhance efficiency, transparency, and accountability. By doing so, Fiji can avoid potential repercussions, such as being issued a yellow card, and ensure sustainable practices in the tuna industry.

The EU yellow card served as a warning to Fiji, indicating that its fisheries management practices were not compliant with EU standards. Concerns related to the transparency, monitoring, and control of fishing activities are highlighted in this study. This signalled potential risks to sustainable fishing practices and the legality of Fiji’s seafood exports to the EU (Fiji Fishing Industry Association (FFIA), WWF-Pacific (WWF), 2021).

Therefore, with the improvements made, we can see that Fiji took adverse steps to address the EU’s concerns. These actions include enhancing the surveillance and monitoring of fishing vessels within the Exclusive Economic Zone (EEZ), strengthening regulations to combat IUU fishing, improving traceability, and collaborating with regional and international bodies to enhance fisheries management (Council of the European Union, 2008). These efforts demonstrate Fiji’s commitment to sustainable fishing practices and alignment with international standards (WWF, 2020).

By 2015, the EU acknowledged Fiji’s substantial progress in addressing IUU fishing issues, leading to the removal of the yellow card (Miller and Sumaila, 2016). The EU recognised Fiji’s improved access to its market and the positive steps taken to enhance fisheries governance. The removal of the yellow card had significant implications for Fiji’s seafood exports to the EU. This positive turn in Fiji-EU relations not only benefited Fiji’s economy but also contributed to global efforts to combat IUU fishing. Subsequently, the volumes depicted above are obtained.

Figure 13 depicts the value (EUR) of processed Fiji Tuna export fish products to the EU market from 2011 to 2023. It shows a fluctuating trend in the values for France, the Netherlands, and Spain. Over this period, the export values varied, with occasional peaks and dips. France consistently maintained the highest export value, followed by the Netherlands and Spain. The graph highlights the dynamic nature of tuna exports to different EU countries, reflecting economic and market factors. However, without specific data points or labels, a detailed analysis would require additional context or information.

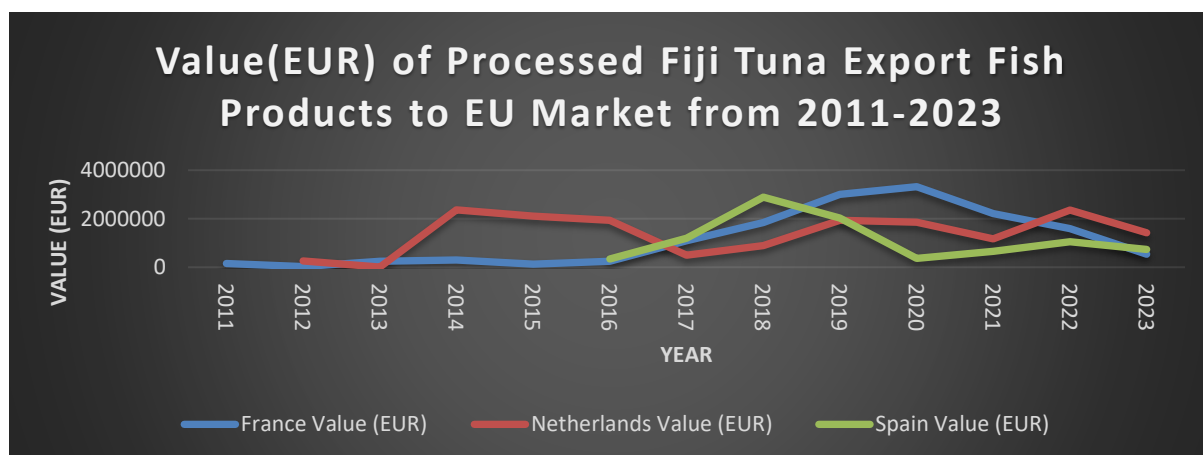


Figure 13. Value (EUR) of processed Fiji tuna export products to EU market from 2011 to 2023.

An examination of figures 14 and Figure 13 reveals a concerning trend in the Fiji tuna fishing and processing industries over the years. Despite initial recovery after the impact of COVID-19, recent years have witnessed a decline in export volumes (Figure 14) Figure 12 and their values (Figure 15) Figure 13, particularly from 2022 to 2023. This downturn is exacerbated by several factors, including inefficient processing reports, lack of transparency, and ineffective turnaround times for market affiliations. The existing paper-based reporting system has proven inadequate, leading to non-transparency and inefficiency. Moreover, the susceptibility to fraud, such as the photocopying of certificates, compromises traceability.

#### *5.1.1 Benefits of digitalised processing report to EU market*

As it may seem imperative, technology has evolved, and digitalisation has paved the way for real-time IT systems for the management of all information, data, and documents linked to fish processing details.

Notwithstanding the evolution of digitalisation, the questionnaire revealed that Fiji went through trial and error before it succeeded in securing a manual process reporting system. Non-compliance with the EU IUU would result in a yellow or red card and may lead to suspension, whereas a breach and lack of complaint within the supply chain production would result in Fiji losing the EU market.

The capacity to cross-check the product and verify the legality of the fish ensures that the product is limited at any point within the supply.

The most important aspect of verifying information is that accurate data are reported by the fishing industry. The Ministry of Fisheries must ensure that the processing data are accurately verified and prove their legitimacy. Data verification is the process of confirming the accuracy and legitimacy of product- or company-level information within the supply chain. It involves cross-checking data provided by various stakeholders or vetted by third parties to ensure their authenticity and prevent potential fraud in traceability (Cruz et al., 2019).

Verification methods include mass balance calculations, data entry validation checks, restrictions on data modification, and validation of data accuracy through fish tickets or landing documents. Additionally, legal fishing can be verified through vessel monitoring systems (VMS) or automatic identification system (AIS) operations, and certificates for health codes or chain of custody compliance can also be verified. Data verification is recognised as one of the fundamental business functions of traceability, as identified by Future of Fish (n.d.).

The Ministry of Fisheries has implemented a systematic approach through the EU Catch Facilitation workflow. This approach aims to enhance commitment by collaborating with the processing industry. The key focus areas include ensuring data accuracy, robust recording practices, and transparency within the supply chain (Department of Fisheries, 2022).

## **5.2 SWOT analysis on digitalisation transitions from processing companies**

Following the SWOT analysis depicted in Figure 10 and Figure 11 the responses from the processing companies indicated that digitisation would streamline tuna processing operations, reduce manual labour, and enhance productivity. Automated processes lead to cost savings and faster production cycles. This transition will ensure the accuracy and precision of data collection and reporting, minimising errors associated with manual record keeping (Council of the European Union, 2008). This accuracy is crucial for meeting regulatory requirements and maintaining compliance with EU standards (Council of the European Union, 2008). Digitalised systems enable real-time monitoring of tuna processing activities, allowing for the immediate detection of any irregularities or noncompliance issues (Eigaard et al., 2015). This real-time

reporting enhances transparency and accountability throughout the supply chain, which is essential for building trust with EU regulators and consumers (Eigaard et al., 2015).

This project identified that Fiji's collaboration with the European Union (EU) will provide benefits from an interim Economic Partnership Agreement (EPA) that provides duty-free, quota-free access to the EU market for all Fijian products. With digitalised systems in place, productivity will increase in the fishing industry, governed by effective fisheries management efforts (Council of the European Union, 2008). Digital systems in place at sea, onshore ports, and fish processing plants will enable the real-time monitoring of tuna quality throughout the supply chain, enhancing traceability and ensuring that consumers receive high-quality, safe products (Department of Fisheries, 2022).

Based on the above research findings on the current reporting process, this study indicates the need for the transition from a paper-based reporting system to digitalisation in Fiji's tuna fish processing industry, which promises significant improvements. Several key changes are expected with the adoption of digital platforms. First, the turnaround time for producing catch certificates, such as the Fiji-EU Catch Certificate (FJ EU CC), will be greatly reduced. Real-time data entry, validation, and processing will replace manual paperwork, ensuring the faster issuance of certificates.

Simultaneously, this research paper also conducted a SWOT analysis of the three EU-established processing companies based on the need for this transition to take place. According to the analyses, a digitalisation processing reporting system will enhance accuracy and consistency by minimising human errors and maintaining standardised formats. Improved traceability—from catch to export—will strengthen market confidence and support sustainable fishing practices.

There are weaknesses and threats; however, the relevant government agencies, processing companies, and other stakeholder agencies can address these weaknesses and threats, as we need to acknowledge this, and we will need to invest in making a change and be able to manage the system in place. It is always best to maintain an open dialogue for training, capacity building, and communication. Staying agile, cooperating, and keeping informed will help us counter digital competitors, cybercrimes, and digital risks.

Market Competitiveness is a critical factor for tuna processors aiming to thrive in the EU market. By streamlining operations and embracing digitisation, processors gain a competitive edge. Efficient processes lead to cost savings, which enable competitive pricing strategies. As the industry evolves, staying agile and adopting innovative technologies will be essential for maintaining competitiveness in this dynamic market (EUAcess2Markets, 2014).

Safety and Compliance are critical aspects of the tuna industry. By leveraging digital records, processors can facilitate compliance with EU regulations and safety standards.

The European Union (EU) imposes rigorous standards for food safety, hygiene, and labelling (European Commission, 2019). Compliance with these regulations is non-negotiable for tuna processors seeking access to the EU market.

Digital records play a pivotal role in fulfilling these requirements. They allow real-time monitoring of production processes, ensuring adherence to safety protocols and enabling the real-time monitoring of tuna quality throughout the supply chain (European Commission, 2019). Moreover, they enhance traceability, ensuring that consumers receive high-quality and safe tuna products. (Council, 2008) Transparency and adherence to safety protocols build consumer trust, reinforcing the industry's commitment to responsible practices.

It is evident that consumers increasingly demand transparency. Consumers want to know where their food comes from, how it was produced, and whether it meets safety standards. Digitalised processing records enable processors to demonstrate authenticity in real time by sharing verifiable information, which builds trust among consumers (European Commission, 2019).

## 6 CONCLUSION

In conclusion, the digital transformation of Fiji's offshore fisheries tuna industry is a proactive approach towards securing a sustainable and well-off tuna industry. By moving away from current paper-based systems to a more robust digital tuna processing reporting framework, Fiji can meet the stringent compliance requirements of the EU market, thereby ensuring continued access and fostering economic growth. This transition not only streamlines operations, transparency, and enhances efficiency and accuracy but also supports the global movement towards sustainable fisheries management. The integration of advanced technologies, such as establishing an EU-wide digital database of catch certificates (CATCH) through the Fish Catch Accountancy system, will empower stakeholders, from government bodies to fishing and processing companies, to maintain high standards of traceability and accountability when producing tuna processing reports. Ultimately, this shift is expected to reinforce market confidence, uphold environmental stewardship, and contribute to the long-term viability of Fiji's tuna industry in the global arena.

## 7 RECOMMENDATIONS

With the establishment of the EU-wide digital catch certificate database (CATCH) and following a review of the successful implementation of the Catch Accountancy System by the National Fisheries Authorities in Papua New Guinea (PNG), Fiji seeks to implement a comparable electronic reporting platform. The objective is to enable effective tracking of catch volumes to and from processing companies and perform mass balance reconciliation (catch accountancy) in real time, without delay. Through the integration of the EU CATCH system with a nationally integrated Fiji Fish Catch Accountancy System, Fiji has the potential to enhance the traceability and accountability of fish catch reported by its processing companies. Real-time monitoring of catch volumes moving into and out of processing facilities would help prevent discrepancies and ensure transparency. This system integration would not only benefit Fiji but also contribute to consistent and healthy seafood markets by limiting the entry of illegal, unreported, and unregulated (IUU) fishing products into both the Fiji and EU markets. Therefore Fiji should consider prioritising the following actions:

- Understanding the content of the Fish Accountancy system with the CATCH system.
- Legal and Regulatory Framework
- Collaboration and Stakeholder Engagement
- Real-time Reporting and Tracking
- Mass Balance Reconciliation
- System Design

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## APPENDICES

**Annex 1*****Standard Operating Procedure: Current Paper-Based Reporting System for issuing a Fiji-EU Catch Certificates to the Processing Industry***

The purpose of this procedure is to establish a systematic process for validating and obtaining Fiji-EU Catch Certificates (FJ EU CC) for FROZEN fish exports from EU-approved Fiji fishing vessels processed in approved fish processing establishments. The following depicts the standardized current paper-based processors reporting and FJ/EU CC system.

Processing companies' steps to obtain a FJ/EU Paper-based Catch Certificate for an EU export consignment.

Below are responds.

1. FJ/EU Processing Company Export Applications:
  - All export applications requiring an FJ/EU FCC must be submitted together for consideration.
2. Document Numbers provided:
  - Request document numbers from the Ministry of Fisheries Compliance Unit.
3. Validation and Verification Criteria:
  - FJ/EU-approved Fiji fishing vessels and EU-approved fish processing establishments must undergo a validation and verification process before being issued with a Fiji EU Catch Certificate.
  - An FJ/EU CC shall accompany all exports if fish are sourced from an EU-approved Fiji fishing vessel processed in an approved fish processing establishment.
4. Details of Fishing Vessel:
  - Provide comprehensive details of the fishing vessel that caught the fish intended for export.
5. License Verification:
  - Confirm the updated license and authorization list for the mentioned fishing vessels.
  - Validate the license validity status.
6. Compliance Checks:
  - Verify the vessel's registration number to ensure it is registered as a Fiji Flag Vessel.
  - Check RFMO records on the WCPFC website and verify FFA good standing certificates.
7. Vessel Monitoring Unit Confirmation:

- Confirm with the Vessel Monitoring Unit that the vessels are fishing with their licensed authorization.

#### 8. Health Certificate Requirement:

- FJ/EU CCs shall not be issued without a valid Health Certificate (HC) issued by the Competent Authority (Fiji Ministry of Health and Medical Services).

Fish Processing Statements and Processing/Landing Summary (FPS)- normally this processing report is produced by the processing company 3 working days after the landing of the catch from an EU Authorized Fishing Vessel.

#### 1. Validation Criteria:

- A fish processing statement is validated for any fish sourced from an EU-approved foreign vessel.
- The catch must have been landed directly at any designated port in Fiji.
- The fish is processed in an EU-approved fish processing establishment.
- The processed fish is ready for export to any territory within the EU.

#### Specific Form Checking

##### 1. Application Review and Verification:

- Applications without an attached FJ/EU CCs (Fiji-EU Catch Certificate) shall be returned to the applicant.
- The following checks are performed by CDS Officer for all export applications sourced from Fiji fishing vessels:
  - Verify that all pages, including Appendices 3, of the FJ/EU CC are submitted by the applicant.
  - Check the correct and proper filling of the form.
  - Validate the License No(s) and verify vessel validity with the Licensing Officer
  - Refer to relevant catch log(s) based on trip date(s).

##### 2. Weight Calculations:

- Calculate related weights from the original catch logs.
- This process may take one to two days, depending on the number of vessels applied for and the availability of catch logs with the Data Unit.

##### 3. Weight Limits:

- The weight applied per species must not exceed the total weight of species landed from the fishing trip.

##### 4. Applicant Guidance:

- If the weight exceeds the acceptable amount based on catch logs, the applicant is advised by Catch Documentation Officers (CDS Officers) to resubmit the corrected weight as per the catch log data.

## Appendix 2

<b>COUNTRY</b>	Fiji					
<b>SECTION</b>	Fishery products					
				Validity date from 10/08/2007	00058	
				Date of publication 03/03/2019		
<b>WARNING</b>	<b>Please note that listing pursuant to Article 127 of Regulation (EU) 2017/625 and Commission Delegated Regulation (EU) 2019/625 is without prejudice to compliance with other requirements, such as those in Council Regulation (EC) No 1005/2008 establishing a Community system to prevent, deter and eliminate illegal, unreported and unregulated fishing,</b>					
<b>List in force</b>						
Approval number	Name	City	Regions	Activities	Remark	Date of request
F/EU01	Golden Ocean 1	Suva	Central	PP		30/12/2018
F/EU02	Golden Ocean 2	Suva	Central	PP		18/03/2011
F/EU03	Solander Pacific Ltd	Suva	Central	CS		18/06/2012
F/EU04	Tispacific Marine	Suva	Central	PP		04/10/2011
F/EU05	Sealand Processors (Fiji) Limited	Suva	Central	PP		30/12/2018
F/EU06	Viti Foods Pte Limited	Suva	Central	PP		30/12/2019
F/EU07	PAFCO Pte Limited	Levuka	Fiji (general)	PP		06/08/2020
F/FV01	Winstar 1 (Golden Ocean)	Suva	Central	ZV		18/03/2011
F/FV02	Winstar 2 (Golden Ocean)	Suva	Central	ZV		18/03/2011
F/FV03	Winfall 6 (Golden Ocean)	Suva	Central	ZV		18/03/2011
F/FV04	Solander II (Solander Pacific Limited)	Suva	Central	ZV		18/03/2011
F/FV05	Solander IX (Solander Pacific Limited)	Suva	Central	ZV		18/03/2011
F/FV07	Solander Kariga (Solander Pacific Limited)	Suva	Central	ZV		18/03/2011
1 / 2						

<b>List in force</b>						
Approval number	Name	City	Regions	Activities	Remark	Date of request
F/FV17	Winfall 1 (Golden Ocean)	Suva	Central	ZV		09/01/2012
F/FV19	Winfall 2 (Golden Ocean)	Suva	Central	ZV		16/03/2012
F/FV21	Lady Ama (Solander Pacific Limited)	Suva	Central	ZV		26/04/2012
F/FV22	Solander XII (Solander Pacific Limited)	Suva	Central	ZV		26/04/2012
F/FV23	Solander XIV (Solander Pacific Limited)	Suva	Central	ZV		26/04/2012
F/FV27	Solander V (Solander Pacific Limited)	Suva	Central	ZV		25/03/2013
F/FV28	Solander III (Solander Pacific Limited)	Suva	Central	ZV		14/05/2013
F/FV29	Solander VI (Solander Pacific Limited)	Suva	Central	ZV		14/05/2013
F/FV30	Solander XI (Solander Pacific Limited)	Suva	Central	ZV		14/05/2013
F/FV32	Winfall 168 (Golden Ocean)	Suva	Central	ZV		10/06/2013
F/FV33	HANGTON 115	Suva	Central	ZV		12/03/2021
F/FV34	HANGTON 116	Suva	Central	ZV		12/03/2021
F/FV35	HANGTON 112	Suva	Central	ZV		12/03/2021
F/FV36	HANGTON 111	Suva	Central	ZV		12/03/2021
<b>Activities Legend :</b>						
CS	Cold Stores					
PP	Processing Plant					
ZV	Freezing Vessel					
2 / 2						

### Appendix 3

#### Questionnaire to the three EU established Tuna Processing Companies in Fiji - Golden Ocean Fiji Ltd, Solander Pacific Processor and PAFCO Fiji Ltd

Name of Processor .....

Telephone contact.....

#### 1.0 LOCATION CHARACTERISTICS

1.1 Company .....

1.2 Location .....

#### 2.0 Processing

1. Please state your name and your role within your organization.
2. Could you explain a bit more about your role when you are receiving and documenting records on the catch reported from an EU-established vessel processed for EU export?
3. Can you describe the current process of documenting fish catch at the processing facility before information on processed catch for export is received by the Ministry of Fisheries?
3. What tools or technologies are currently used for process documentation?
4. Could you explain the process of stock received for process and the disintegration of catch based on market requirements?
5. When did you start processing for EU normally when receiving catch from EU-established or certified vessels for processing?
6. What product type of fish do you normally process to EU?

I know that within the system that are often infinite number of pathways and permutations through which the product enters, meanders, and eventually reaches its end market destination. The system is not a transparent sequence of established relations in understanding where this will follow throughout the supply chain.

I believe this is usually semi-processed. Correct me, I believe whole-round tuna catches are regarded as semi-processed as it enters to EU market. Do you have some knowledge to what extent does the information received, and you have that knowledge that this catch will be re-exported to other international market or any EU member country. Could you comment on the statement above?

7. Based on the previous questions, does your company maintain records complete enough to allow the lot/batch numbers of processed tuna to be traced back to the corresponding TTF number. This is utilized during a trip where it shall be identified by a unique number. If Yes, could you explain about the process in place when distinguishing the clear traces of fish along the supply chain?
8. What products do you process and when do you normally do the processing?
9. What would be preferred products, size, and species for EU Market?

10. Could you discuss and elaborate what the forms do you use in terms of receiving fish for processing?

11. How do you classify your processors? Is it Primary processors or Secondary processors? Could you further explain when you receive fish from an EU-established vessel?

12. Could you briefly explain the channel of receiving fish from EU Vessel for either fresh catch or frozen catch? What is the process of receiving catch from vessels either fresh or frozen? What is the process you normally do when using catch accountancy and at the same time you are held accountable of every fish that is received by the processor?

13. When do you normally do the processing in a day when referring to stock on hand and frozen stock received?

14. What is the quantity you process daily / weekly/monthly?

15. Who are the main buyers of the processed fish? For Domestic sale and EU International market?

16. What type of processed products have the highest demand and why?

17. What type of processed products have the lowest demand and why?

18. Where do you obtain the fish you process and from which vessels?

19. What is your yield ratio for loin from a whole fish

20. Is there a shortage of fish especially when you trying to meet a market demand? And when is this shortage greatest?

16. Where do you sell your processed products to? Rank the main buyers.

17. Fiji was issued with a yellow card by EU committee back in 2015 for not complying to the regulatory requirements of the EU IUU Regulation (EC 1005/2008) and then in 2016, the yellow card was uplifted, how has this affected the processing requirements when dealing with systems in place to improve the conditions set in place from improvements?

14. Fill in the table below for the volume and unit price you sold the processed fish in 2020 – 2023?

15. Do you always have enough processed fish to satisfy customer demand? If no, what other sources do you use to maintain customer demand?

16. Do you know of a better market outlet where you would rather sell your processed fish? If yes, why are you not able to access these market outlets?

17. What do you think can be done to access these market outlets?

18. Please summarise and fill in the Annual Quantity processed over the past three years. This is to address the development of Fish Process to EU Market since the period of the uplifting of the yellow card.

2018

Species	Quantity	Processed – Product Type	Unit Price per Quantity
ALB			
YFT			
BET			
OTHERS			

2019

Species	Quantity	Processed – Product Type	Unit Price per Quantity
ALB			
YFT			
BET			
OTHERS			

2020

Species	Quantity	Processed – Product Type	Unit Price per Quantity
ALB			
YFT			
BET			
OTHERS			

2021

Species	Quantity	Processed – Product Type	Unit Price per Quantity
ALB			
YFT			
BET			
OTHERS			

2022

Species	Quantity	Processed – Product Type	Unit Price per Quantity
ALB			
YFT			
BET			
OTHERS			

2023

Species	Quantity	Processed – Product Type	Unit Price per Quantity

#### Quality and Quantity of the Processed catch for EU Export Market

1. Could you provide a simple explanation when refereeing to the catch that is received and processed?
2. What is normally done to stock frozen in containers for future intakes of catch that is received?
3. In terms of reporting accurate date within the processing and movement amongst the supply chain. What is the procedure that you normally use to capture the movement along the supply change?
4. How to report on catch that is received from MSC Vessels to Non- Non-MSV vessels and at the same time provide effective procedure in terms of distinguishing catches between EU Vessels and Non-EU vessels?
5. Which months do you process the highest and lowest volumes? (can obtain annual trends if possible)
6. Based on the knowledge of providing effective terms and conditions. I presumed that those were the knowledge implemented under restricted conditions provided by the company's marketing management.

#### Challenges and Issues:

1. I do understand there is less catch coming in from your EU fishing vessels, and I do know that there is a lot of transshipment at sea catch from and to sister vessels. How do you encounter such situation when dealing with receiving catch from Non – EU and EU Certified vessels ensuring that there is no mixture of catch between vessels when landing of catch to processing is concerned?
  2. How can you be rest assured that there are no mixture of fish when processing fresh catch from vessels transhipped out at sea?
  3. What are logistics arrangements set in place or forms filled to allowing that catch are clearly disintegrated allowing that there should no mixture of fish?
2. In your experience, what challenges do you face in the current fish catch documentation process?
  2. Are there any specific issues related to accuracy or efficiency that you encounter within your working environment in terms of documenting the catch status?

Suggestions for Improvement:

1. If you could change or improve one aspect of the current documentation process, what would it be?
2. Are there any innovative ideas or technologies you believe could enhance the efficiency of fish catch documentation?

Training and Awareness:

1. Are you aware that FFA is looking towards implementing and providing an in-depth consultation to member countries encouraging the transition of changing the catch certification standards from manual/paper-based catch documentation to digital implementation of fish processing techniques with its legal provisions?
2. Is there any know are you trained on the documentation procedures?
3. Is there ongoing awareness or training programs to keep the staff updated on changes or improvements?
4. What is your general views on such transition? What would this bring about to the work that you normally do and what are the outset pf providing an efficient work involved around this catch documentation procedure?

Technology Integration:

1. Have there been any recent efforts to integrate digital technology into the documentation process? Are there any thoughts of making a transition from paper-based to digital transitions?
2. How would you rate the work that you do when you diverge into the envisioned transition impacting your daily workflow?
3. Will this bring about work efficiency and generate a proactive approach in providing transparency along the supply chain?
4. What are your thoughts on the potential benefits of transitioning to a digitalized system?
5. How would you see this digital system. Will there be loss of jobs by works along the supply chain?
6. Will this transition impact the rate of the work that you do daily?

Current User Experience:

1. How would you describe the user experience with the current documentation tools or systems?
2. Are there any aspects of the current system that you find particularly user-friendly or challenging?
3. How confident are you in the accuracy of the data recorded during the documentation process?

Data Accuracy:

1. Looking at the rate of certainty of catch received for processing. How accurate the current process is used when dealing with processed products ensuring that
2. Are there instances where inaccuracies or discrepancies in data have caused issues?

3. I understand that you are reporting catches that often are stocked to avoid intermixing fish. How do you disintegrate the catch ensuring that there is no intermixing of catch?

Transition to Digital:

1. What are your expectations or concerns regarding the transition from a paper-based to a digitized documentation system?

4. Will this transition create an outset or great feedback making good changes on work ethics and efficiency on the rate of work, especially when providing a consistent service to your market?

Feedback and Communication:

19. What problems do you face in fish processing with this current paper-based reporting system? (Lack of market, Low prices, High post-harvest losses due to lack of storage facilities)

20. Please rank them starting with the most serious one

21. Give suggestions on how best the above problems can be solved

22. When you run out of the preferred fish what do your customers opt for?

23. When are fish prices highest/ lowest? Give reasons for your answer.

1. How is feedback typically communicated regarding the documentation process?

2. Are there channels for employees to provide suggestions or report issues related to documentation?

Health Competent Authority

1. Who is your point of contact with the Health Competent Authority?

2. When does the health competent authority come in to provide trace services after you have made arrangements with them to issue and issue the health certificate?

3. Could you explain the process of how you interact with the Health Competent Authority to obtain a Health certificate?

GRADING FOR SALE

24. Do you grade your fish after processing? If yes, what do you base on while grading (size, species, product)?

25. What problems do you face while grading?

26. When does the health competent authority come in to provide trace services after you have decided with them to issue and issue the health certificate?

27. Could you explain the trace procedures they use to certify the fish to be legible to receive a health certificate?

26. How are you coping with the above-mentioned problems?

27. Give suggestions on how best the above problems can be solved

28. Do you experience any post-harvest losses?

29. What kind of post-harvest losses do you experience in fish processing?

30. Give suggestions on how best the above losses can be reduced?

