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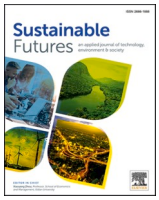

Perceptions fuelling the demand for high value imported aquatic food in China

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ABSTRACT

China is a dominant player in the global aquatic food market, importing around USD 22 billion worth of aquatic foods in 2022, primarily highvalue species such as Atlantic salmon, lobster, abalone, and sea cucumber. Despite this, the drivers behind the demand for high-value imported aquatic food in China are under-researched compared to Western markets. This study explores these drivers and provides insights into the perceptions shaping demand. Secondary data analysis using China Customs data, alongside semi-structured interviews (n = 30) at fisheries and seafood trade shows in Shanghai and Qingdao, reveals significant findings. The study shows a notable increase in the importation of high-value species like crustaceans from the Americas and ongoing diversification in consumer preferences. Perceptions of quality, health, and food safety, influenced by cultural and social norms, greatly impact consumer demand. Products from certain countries are trusted more due to perceived higher safety and quality standards. While traders prioritize traceability for food safety and origin transparency, sustainability often remains a secondary concern, creating a gap between market practices and policy goals. To address this, traders should maintain traceability while placing greater emphasis on sustainable sourcing, supported by public awareness campaigns. Promoting sustainable practices is key to building a resilient, environmentally responsible trade system that ensures the long-term viability of aquatic resources and supports sustainable futures.

1. Introduction

Global trade flow in food commodities is valued at approximately USD 2 trillion in 2023 [1]. Aquatic food is one of the highest-valued food commodities – export value reached USD 195 billion in 2022, and are now comparable to the total value of trade (including export and import values) for all terrestrial meats (cattle, pig, poultry and sheep) (Food and Agriculture Organization [[2], 2024]. The value of the overall international trade in aquatic foods has only been possible due to the rapid expansion of aquaculture as global capture fisheries production has been stagnant since the late 1980s [3–5]. In 2022, about 37.6 % of global aquatic food production entered international trade [2], which is comparatively high compared to other food commodities, for instance, 9.8 % for meat and 6.7 % for milk and dairy products [6]. Further, Tveterås et al. [7] estimate that 78 % of aquatic food products are exposed to international trade competition. Another distinctive feature is the high diversity of aquatic products traded; currently, there are >600 aquatic species traded internationally in 225 states and territories of the world [2]. However, trade was dominated by a narrower range of species groups; in 2022 these included salmon and trout (20 % share in value), shrimp and prawns (17 %), groundfish and other whitefish (9 %), tuna (9 %), cephalopods (7 %) (ibid). In recent years, the demand for high-value aquatic species[1] has been growing in developing countries, particularly in emerging economies of East and Southeast Asia. In these regions, increased urban middle-class incomes have led to dietary diversification, including more meat and aquatic food in their diets, ultimately changing the historical global aquatic food trade network [8–10].

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[1] High value aquatic species are any aquatic species that hold significant economic worth due to their demand, price and market appeal.

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China, the largest aquatic food market, dominates global aquatic food production, consumption, and trade activities [2]. In 2022, China produced and consumed more than one-third of all global aquatic food. It is one of the main exporters of aquatic animal products (12 % of global export value) while the second largest single importing country (12 % of the global import value) following the United States (17 %). In 2021, China imported around USD 22 billion worth of aquatic foods, mostly high-value species (e.g., Atlantic salmon, lobster, abalone, and sea cucumber) that represent a growing proportion of the aquatic food market [2,11,12]. Salmon, lobster, abalone, and sea cucumber were among the most common high-value aquatic species consumed in China [13] while other aquatic species including tuna, haddock, cod, Alaska Pollock, and Pacific salmon are almost exclusively imported for re-export (re-export share > 75 %) [14]. The consumption trend of high-value aquatic species in China is driven by broader economic sociodemographic and lifestyle changes including urbanisation, rising income, and changing food preferences [15]. According to the FAO projection, by 2030, China is expected to account for 37 % of all global consumption of aquatic food. Chinese decisions about what to eat and how and where to acquire aquatic food are becoming increasingly crucial to understand, not only for China but also for the rest of the world – given its impact on food equity, safety, security, and the environment [3,16–18].

To date, aquaculture production has experienced significant growth in the South, Southeast, and East Asian regions, driven by positive societal attitudes and supportive governmental policies [19] – producing >90 % of global aquaculture in 2022. However, domestic aquatic production might not necessarily address Chinese consumer preferences for specific high-value aquatic species and trade is a way to align preference with supplies. For instance, Chinese consumers' increasing preference for Atlantic salmon, is almost completely based on imports as the cost of breeding is relatively high and farming Atlantic salmon in China has faced many technical challenges [20,21]. Furthermore, ever-stricter regulations and certification schemes in High-Income countries [22,23] have arguably raised standards and made Western aquatic products, particularly European aquatic products, more sustainable and safer to eat, enhancing their desirability in export markets such as China.

The contentious nature of this trade is evident, as some argue that the growing export of aquatic food products to China generates additional earnings, reduces trade deficits, and drives the expansion of aquaculture in High-Income countries. Proponents also claim that this trade may contribute to sustainable futures by promoting innovations in aquaculture and more efficient resource use. However, opponents contend that such seafood exports to emerging economies further exploit local natural resources, harm small-scale fisheries, and increase greenhouse gas emissions from intercontinental transportation undermining long-term sustainability and placing undue pressure on ecosystems critical for future resilience [16,24–26].

The perceptions that are fuelling the demand for imported aquatic food in the Chinese market are distinct from those of well-documented markets in Western countries but remain comparatively under-researched [15]. A quick search in the Scopus database was carried out on 26 May 2024 with the search string (ALL (import* OR trade) AND TITLE-ABS-KEY ("aquatic food" OR seafood OR "fish*" OR "shellfish") AND TITLE-ABS-KEY (China OR Chinese)) that resulted in 7736 potential documents published in the English language. Altogether 16 documents were targeted to further understand the aquatic food trade of China, the majority being overviews of the China seafood trade and export of domestic seafood products. While 21 documents were focused on understanding aquatic food consumption in China, the majority were cross-sectional surveys to understand the consumers' seafood buying intention and behaviour. Among these documents, only one document conducted an in-depth understanding of perceptions of sea cucumber consumption, and the factors influencing its import [27]. Further, a study by O'Malley et al. [28] employed a traders' survey to investigate the consumers and suppliers involved and the drivers of demand for dried gill plates from manta and devil rays. The remaining documents either investigated Chinese consumers' buying behaviour or discussed ways to improve the export of Chinese aquatic food products or were irrelevant. Further, none of the studies conducted in-depth, current, and practical insights into the imports of high-value aquatic food and the market landscape. Thus, there is a challenge in understanding the perceptions of the growing demand for high-value aquatic food in China.

In order to fill a significant gap in the literature, this paper offers a novel contribution by specifically focusing on the importation of high-value aquatic foods—an area that has been relatively under-explored in both academic research and industry reports. While previous studies have primarily examined general consumption trends or domestic aquatic food production and exportation, they have not provided a comprehensive understanding of the unique dynamics, logistical challenges, and market drivers that shape the demand for high-value imported aquatic foods in China. This study aims to bridge this gap by combining secondary data analysis with semi-structured interviews with key informants to provide in-depth insights into the perceptions influencing demand, as well as the underlying supply chain dynamics. The research design ensures a holistic understanding of how high-value aquatic foods are imported, the complexities of the trade, and the evolving consumer preferences in China. By focusing on high-value imports, this study adds a critical layer to the existing literature, offering fresh perspectives on factors such as traceability, certification, and changing market demands, and thus provides valuable contributions to both academic knowledge and practical industry applications.

2. Methods and materials

Firstly, Chinese customs data were collected and analysed to understand the import trends of aquatic food in China. The publicly available China trade data [12] were extracted in Excel, where comparative analysis was performed and presented as graphs. Secondly, interviews with key informants were conducted to gain deeper insights into their perceptions of the demand for imported high-value aquatic food in China. These informants were selected based on their extensive professional experience in the aquatic food trade, ensuring that their perspectives reflected aggregated consumer demands and market trends. This approach allowed for the collection of detailed insights from individuals directly involved in aquatic food trade and distribution. While this method was chosen due to logistical constraints and the study's focus on supply chain dynamics, the lack of direct consumer input may limit the understanding of end-user expectations and decision-making processes. Primary data were collected through semi-structured interviews conducted at the 17th Shanghai International Fisheries and Seafood Exhibition, Shanghai (August 2023) and Qingdao China Fisheries and Seafood Expo, Shandong, China (October 2023). Thirty key informant interviews were conducted that lasted 30 –

Table 1
Characteristics of the key informant interview, $N = 30$.

Characteristics	Categories	
Age, years, mean ± SD		37.13 ±6.28
Gender	Male	70 (21)
	Female	30 (9)
Position, %(n)	Importer	40(12)
	Sales	26.6(8)
	Distributor	13.3(4)
	Marketer	10(3)
	Producer and exporter	6.7(2)
	R&D	3.3(1)
Experience in the company, y, mean ± SD		7.70±4.20
Experience in the field, y, mean ± SD		10.83 ±5.34
Species specialised, %(n)	Salmon	60(18)
	Multiple	40(12)

SD = Standard deviation, % = percentage, n = number.

60 min. The selection criteria for participation were based on their working experience with imported high-value aquatic food in China. Table 1 shows an overview of the participants' composition.

A semi-structured interview guide [29] was developed to capture the in-depth opinions of key informants. The findings from secondary data analysis facilitated the design of the semi-structured interview guide in several ways. It helped determine which species to focus on by identifying those with the highest trade values. It also revealed the primary concerns and trends within the market, such as consumer preferences, price fluctuations, and supply chain issues. The interview guide also included probe questions, such as, "Can you give an example?" to elaborate on their responses. The guide was adapted to the subject of interest based on several previous studies [27,30–32] and the questions focused on a range of topics related to trade, consumers' and buyers' preferences, pricing and market trends, and aquatic resource governance in source countries and China. The interview guide was assessed by four academics, resulting in minor changes in structure and wording. Apart from interviews, observations were also conducted, as well as informal conversations with importers, marketers, and distributors at the Shanghai seafood market and three Carrefour retail outlets in Shanghai, China. The interviews were conducted by four researchers (three from the Shanghai Ocean University and one from the University of Stirling). The majority of the interviewees specialized in the salmon market (60 % of the interviews) (see Table 1). Interviews were audio recorded, or detailed notes were taken depending on interview preference. The audio-recorded interviews were transcribed by interviewers and translated into the English language following standard practice [33–35]. The transcripts and notes from interviews were then qualitatively analysed for themes that emerged. The five stages of the framework analysis approach (familiarization, identifying a framework, indexing, charting, and mapping and interpretation) for qualitative data analysis were performed [36]. The process of framework analysis and presentation of findings has been adapted from previous studies [37].

Participation was strictly voluntary and written (in some cases verbal) consent was taken from each participant before conducting the interviews. Informants were informed about the confidentiality of the data handling, and anonymity was ensured by using pseudonyms. The study was evaluated by the general University of Stirling Ethical Panel, and ethical approval was granted (Ref nr., 12,406).

3. Results and discussion

3.1. Import trend analysis of high-value aquatic food

The results from the secondary data analysis (Fig. 1) indicated that high quantities of aquatic food are being imported into China from other Asian countries, the Americas and Europe. Asche et al. [14] estimated that 74.9 % of Chinese aquatic food imports are re-exported, suggesting that domestic demand is not driving China's export orientation and associated sustainability concerns. Aquatic species such as Tuna, Cod, Haddock, Alaska Pollock, Pacific Salmon, Flatfish, Cuttlefish and Squid are mostly imported for processing and were re-exported (ibid). The advancements in freezing technology have allowed aquatic food processing to occur away from landing locations, based on comparative advantage. As a result, China has become the largest importer of various aquatic species, including frozen cod from Norway, salmon and Alaska pollock from the United States, and Pacific salmon from Russia, as well as a major exporter of processed products like frozen fillets [38–40]. The result from this study indicated that the COVID-19 restrictions had influenced the aquatic food trade, sharply reducing imports, especially from Europe, that reached their lowest point in 2020–2021 before sharply rebounding in 2022. The findings are consistent with a recent study that found a rapid rebound in general consumption occurred after experiencing a sharp decline, exhibiting a V-shaped recession-recovery pattern [41]. In 2022, China appears to have imported higher volumes of valuable aquatic species from the Americas compared to other regions, as depicted in Fig. 1. Crustaceans such as shrimp and prawns have the highest value, while various other aquatic species categories such as salmon, cephalopods, and whitefish also have significant import values and quantities (Fig. 2 and Supplementary Table 1). Ecuador has the largest contributor to crustacean imports with about 37.88 % of the import value (Fig. 3); most are Shrimps and Prawns with head-on, shell-on (HOSO) shrimp that are processed into value-added products for the domestic market and re-export [42]. Other significant contributors include Russia, Vietnam, and Canada, which supply valuable species like crabs, lobsters, and cuttlefish & squid. Newton et al. [43] point out that the increase in imported high-value aquatic food observed in China does not imply a decline in the consumption of traditional species, but rather a diversification of consumer preferences that includes both more expensive species and affordable commodity products in the diet. Notably, China imports large volumes of *Pangasius hypophthalmus* catfish from Vietnam to meet domestic demand, reflecting a preference for this affordable and versatile fish [44]. Further, in general, frozen aquatic food products are becoming more popular in China and the growth rate of the imported frozen aquatic food products reflects this [45]. The rise of supermarkets and e-commerce – as opposed to traditional wet aquatic food markets – are much more closely linked with the sales of frozen aquatic food in China [46].

3.2. Perceptions fuelling the demand for high-value aquatic food

After analysing the qualitative data, seven distinct framework categories emerged that reflected the key informant's perception of the increasing demand for high-value imported aquatic foods in China. The identified framework categories are presented and discussed as follows:

3.2.1. Changing consumption preferences for aquatic food

In general, there is a significant shift in aquatic food consumption

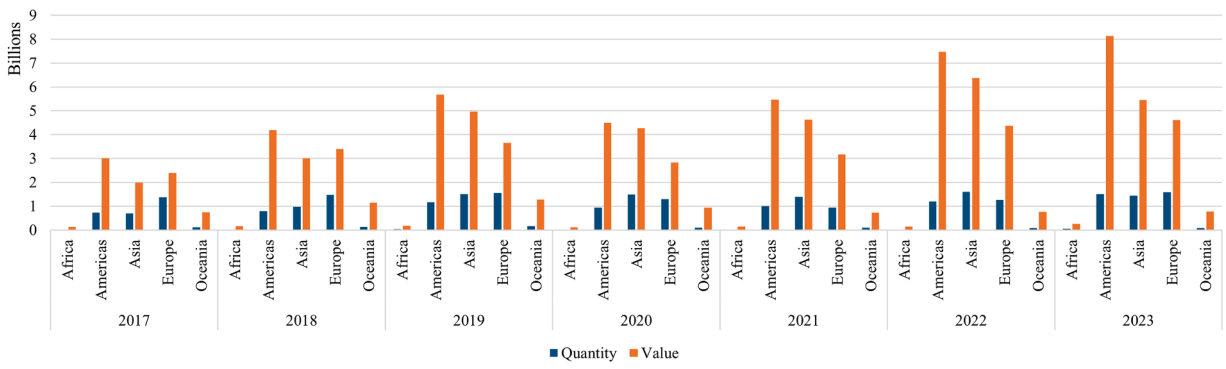

Fig. 1. Quantity (in kg live weight) and value (in USD) of aquatic food imports into China by region, 2017–2023.
Note: Unspecified aquatic species were removed from the analysis.

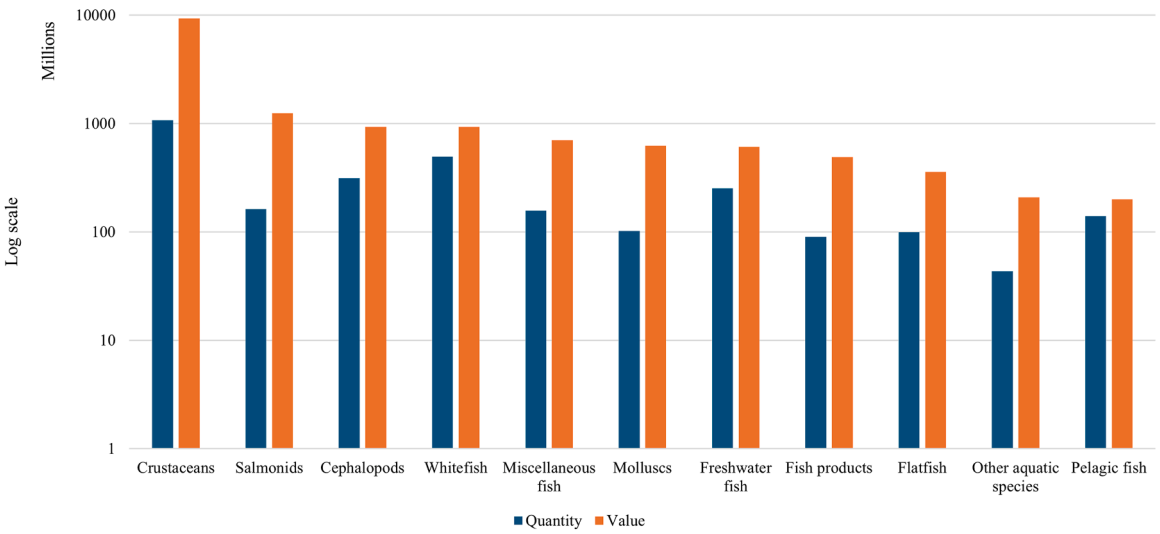

Fig. 2. Import Value (in USD, log scale) and Quantity (in kg live weight, log scale) of Aquatic Species Categories Imported into China, 2022.
Note: Unspecified aquatic species were removed from the analysis.

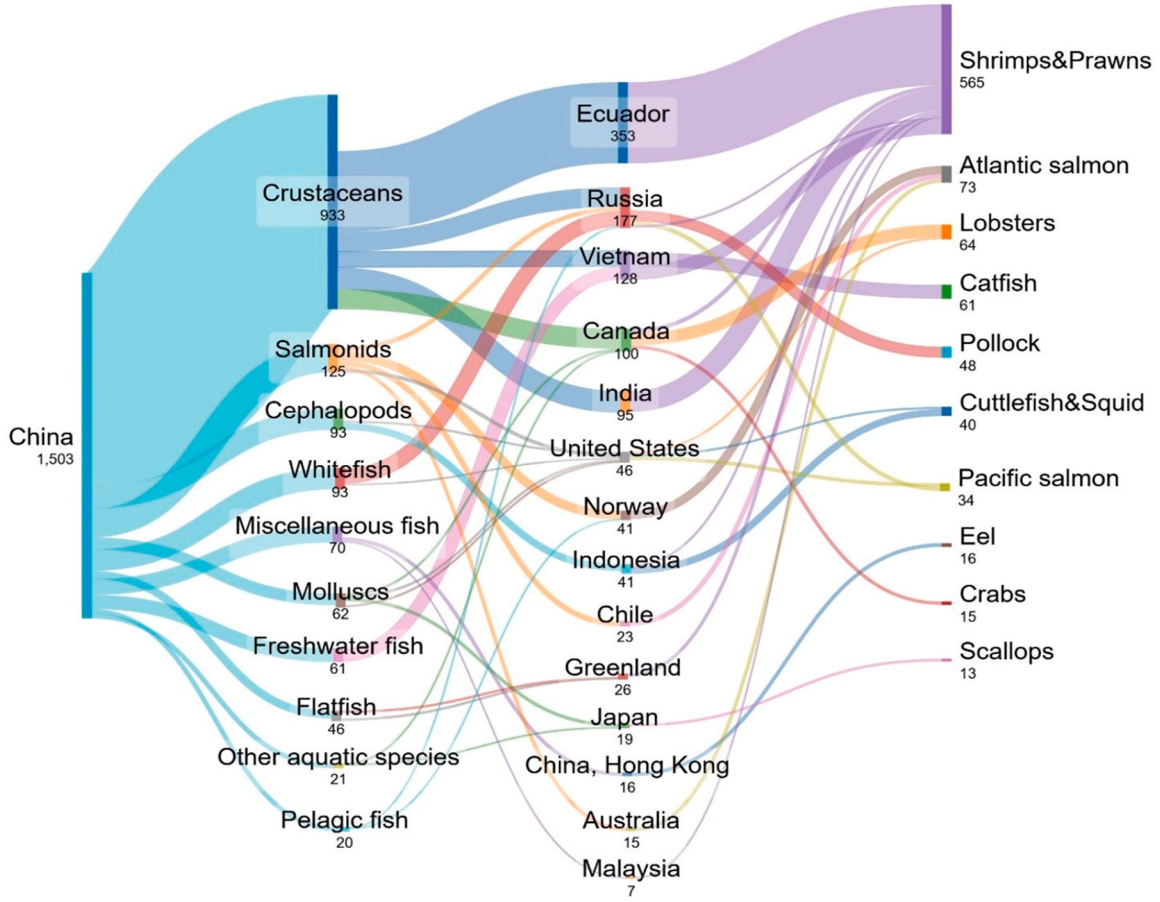

Fig. 3. Categories of imported aquatic species, their source countries, and their main species, with values in ten million USD for 2022.

patterns across China. Informants emphasised that this shift is closely linked to urbanization and the country's rapid economic development, which has resulted in a growing demand for diverse and higher-value imported aquatic food products. Informants indicated that consumers, particularly from first and second-tier cities, have increased disposable income, greater exposure to Western foods, and higher health consciousness, which might have contributed to this trend. A recent survey found that residents across China consistently place health and nutrition as the main reasons for aquatic food consumption [47]. This is supported by informants who observed that "…high-value imported aquatic food products are healthy…" (Importer, 35, male) and that "…they are perceived as a part of a healthy lifestyle…" (Marketer, 40, male). Individuals who are more motivated towards a healthy lifestyle would give more importance to natural food [48]. Aquatic food is often considered a

natural food due to its minimal processing, rich nutritional profile, and potential for sustainable sourcing. It is believed that compared to many terrestrial animal products and highly processed plant-based alternatives, aquatic food maintains more of its natural qualities, making it a valuable part of a balanced and healthful diet. For instance, aquatic foods, particularly high-value species such as salmon, sea cucumber, and abalone, are considered nutritionally beneficial sources to human health as they contain omega-3 polyunsaturated fatty acids and other natural contents [49,50]. Further, high-value carnivorous local aquatic species like Yellow Croaker (*Larimichthys polyactis*) and Chinese Sturgeon (*Acipenser sinensis*) are facing competition from imported high-value species such as salmon, sea cucumber, lobster, oysters, and abalone. These imported aquatic species are perceived as luxury items and are often associated with health benefits. While carp continues to be popular, the aquatic food market dynamics are shifting as consumers seek out these premium options. Thus, the food consumption model among Chinese consumers is shifting from "eating well" to "eating healthy," resulting in a higher demand for healthy aquatic foods in their diet [51,52]. However, "healthy" does not always equate to higher-priced or higher trophic-level species. Many nutritious options, such as small pelagic fish, are both affordable and rich in essential nutrients, while higher trophic level species like tuna and salmon, though sought after for their health benefits, can be more expensive and prone to accumulating contaminants like mercury. There is literature in China on the health risks associated with consuming higher trophic species, emphasizing the importance of informed consumer choices [53,54].

Following the COVID–19 pandemic, consumers increasingly use other sales channels including e-commerce platforms such as JD.com, and Alibaba Group (Taobao) to buy their preferred aquatic foods. Chen et al. [55] found that the preference for fresh food e-commerce shopping was accelerated by the COVID–19 lockdown with the usage rate increasing by 48 % compared to the period before the lockdown. Further, e-commerce platforms have facilitated access to a wider range of aquatic foods including high-value imported aquatic species at competitive prices [4]. As one distributor noted, "…due to JD.com and Alibaba, many products are very accessible, and prices are reasonable too…" (Distributor, 39, male). Liu and Chen [56], indicated that young consumers of urban areas are increasingly consuming convenient food reflecting their urban lifestyle: an individualised or self-centred, technology-dependent and fast-paced lifestyle. These young, urban consumers value convenient food aligned with a flexible daily schedule and relaxed lifestyle. They seek to reduce household burdens, save money and taste a variety of food. While some consumers may find the preparation of aquatic food, such as cutting or removing skin, to be time-consuming or challenging, the convenience of aquatic food often comes from the availability of ready-to-cook or pre-prepared options, such as canned, smoked, frozen, or pre-filleted ones. These products require less preparation time and skill compared to whole fish or shellfish, making them a more accessible option for busy individuals. Further, although aquatic food may not always be cheaper than other alternatives, farmed whitefish species like tilapia and pangasius are currently more affordable than many meat cuts in several Asian countries [57].

3.2.2. Quality, and food safety

Quality and food safety are important factors influencing the aquatic food consumption pattern in China [58,59]. Informants perceived that consumers are seeking aquatic food products with higher quality and food safety. Chinese consumers with disposable income appear to be following the pattern of Maslow's hierarchy of needs, i.e. individuals satisfy their basic subsistence needs before then prioritizing quality and safety, especially regarding food products [60]. As one informant noted, "…consumers are cautious, they check where it's coming from and if it is safe to eat…" (Research and Development, 32, female). Consumers are increasingly cautious of potential health risks associated with contaminated aquatic food. Following Japan's nuclear wastewater discharge into the Pacific Ocean, Chinese consumers have become more vigilant about the quality and safety of aquatic food, with some even reducing their consumption of aquatic food originating from Japan [61]. Further, they perceived that consumer trust imported aquatic food products from countries other than Japan for quality and safety standards compared to domestic products. As another informant observed, "…consumers think imported aquatic food products are safer to eat and have higher quality…" (Importer 1, 45, male). Consumers perceived that imported aquatic food products undergo inspection and testing procedures both at the production source and upon entry into China [62], which assures them of the safety and quality of these imported products. Additionally, traders interviewed for this study emphasized that most of the aquatic food products seeking access to international markets have Hazard Analysis and Critical Control Points (HACCP) certification or compliance for aquatic food products. As such certification is often regarded as a prerequisite for meeting recognised safety standards, particularly in China, which imposed stricter food safety regulations following COVID–19 pandemic [63].

3.2.3. Cultural influence and social norms

Informants highlighted the significant impact of cultural factors and social norms on consumer preferences and behaviour towards aquatic food in China. Among affluent consumers, consuming imported high-value aquatic species has become a symbol of status and prosperity. These findings are in line with previous studies that found that high-value aquatic food consumption was more influenced by the symbolic value motivation dimension than the food value dimension [13,30,64,65]. As one informant noted, "…in social gatherings and festivals, having expensive seafood has become a symbol of status and prosperity…" (Importer 1, 43, male). Beyond taste, the main attraction of high-value aquatic food for some consumers is their price, which symbolizes respect and honour for guests. In China, these costly aquatic dishes are referred to as 'face dishes' (mian cai, 面菜) because they are intended to 'give face.' Hosting a lavish aquatic food banquet serves to reinforce social ties, and in professional settings, it facilitates networking, maintaining 'guanxi' (关系), and building relationships with influential individuals [66].

Further, younger consumers are increasingly consuming imported aquatic foods as part of their modern lifestyle. Although this study did not specifically organise attitudes by key themes for different age groups, this observation highlights a notable trend among younger consumers. They perceived these foods as trendy and sophisticated, aligning with their desire to explore diverse culinary experiences. For instance, salmon is commonly enjoyed in sushi and sashimi dishes, typically at social gatherings in out-of-home dining settings, reflecting a fusion of traditional Japanese cuisine with contemporary Chinese dining preferences.

This trend is fuelled by the influence of social media platforms such as TikTok and WeChat, where influencers and aesthetically pleasing images of aquatic dishes encourage younger generations to seek out aquatic dishes dining experiences. As one marketer observed, "…social media platforms like TikTok and WeChat are popular these days… companies hire celebrities/influencers to showcase salmon…making them look super trendy and desirable…" (Marketer, 38, female). Corvo et al. [67] pointed out that social media serves an aesthetic and emotional purpose, exemplified by "food selfies" that showcase meals and beverages being enjoyed. Sharing these food images fosters a virtual sense of togetherness, attempting to recreate the joy of communal dining. Although social media content covers a range of food types, there has been a noticeable emphasis on high-value aquatic dishes compared to terrestrial alternatives. For example, on Instagram, the hashtag #sushi has 38 million posts, significantly more than the 17 million posts for #steak as of 25 July 2024. Luxurious options like sushi and sashimi, often receive more attention on social media platforms like Instagram and TikTok due to their aesthetic presentation and associated with high-status dining experiences. This focus has contributed to the

normalisation of consuming imported high-value aquatic food products, particularly among young consumers residing in urban cities, and reinforcing existing social norms surrounding aquatic food consumption.

3.2.4. Country-of-origin and trust

Country of origin and trust emerged as a prominent framework in exploring Chinese consumer demand for imported high-value aquatic food. Informants perceived that consumers are increasingly placing significant importance on the country of origin, associating certain countries with higher standards of food safety and quality. This perception leads to greater trust in aquatic food products originating from those countries. Specifically, aquatic food products from European countries are generally perceived as having higher standards for food safety and quality, based on their established reputation, stringent regulation measures implemented by European countries, and technological advancements in food processing. As one imported noted, "Our clients demand salmon from Norway because they regard it to be of high quality and safe" (Importer 2, 45, male). Another informant emphasized, "European countries have strict regulations and adapt technology to make sure their seafood products are safe and high quality" (Sales, 37, male). Further, informants perceived that consumers seem to also associate certain countries with specific aquatic food products famous for their quality and authenticity. For instance, salmon from Norway, oysters from France, and lobsters from Canada are perceived as particularly desirable. While these products are perceived as particularly desirable, the lack of verification mechanisms raises concerns about the authenticity and trustworthiness of these claims. These findings are in line with previous studies that found that place of origin branding is important in highlighting high-quality seafood products [27]. However, the strong reputation for quality associated with certain countries can lead to a risk where aquatic food is marketed as originating from these preferred countries without independent validation. This issue is particularly challenging in China due to traceability problems [68], which can undermine consumers' trust and complicate efforts to ensure food safety and authenticity. Some informants pointed out that as Japan has started discharging so-called "treated" and "diluted" water from the damaged Fukushima Daiichi nuclear power plant into the Pacific Ocean, there is a general food safety concern and a lack of trust in the aquatic food originating from the region. These findings are in line with findings from recent studies that indicated that the information negatively affects willingness to pay for aquatic foods caught on high seas, leading to reduced import of aquatic food products from the region [55,69]. The role of social media in informing consumer interest was recently demonstrated by Chinese social media star, Wang Hai's warning of excessive sodium metabisulfite residues (a commonly used preservative in food products, including frozen shrimp to prevent microbial growth and discolouration to make them appear fresher) found on shrimp imported from Ecuador [70]. This led to several follow-up interviews with Chinese media, reduced consumer trust in Ecuadorian shrimp and a Government import suspension on nine major Ecuadorian shrimp exporting companies (Global Food [71]).

3.2.5. Production method

Informants highlighted that production methods do matter for some of the high-value imported aquatic foods such as sea cucumber, abalone, sea cucumber, and bluefin tuna. Some noted that wild-caught products offer a premium price, particularly in food service sectors where high quality and superior taste are demanded. Similarly, Zheng et al. [72] found that there is a strong preference for wild-caught salmon over farm-raised options. Particularly, Chinese consumers exhibit a relatively high willingness to pay a premium for wild salmon, with the additional amount ranging between $12 and $14 per 500 g, which is comparable to their preference for chilled products. As one importer observed, "…most don't care about how it's produced, but some do prefer wild-caught…" (Importer, 40, male). However, most informants acknowledged that both wild-caught and farmed aquatic foods are valued by consumers for different reasons. While wild-caught products are often associated with premium quality and taste, farmed options are increasingly popular across various segments of the market. As one producer and exporter noted, "…farmed are popular because it has a good quality all year round…" (Producer and exporter, 48, male). Farmed products such as farmed Atlantic salmon are valued for their consistency, availability, and affordability, making them accessible to a wider range of consumers. Additionally, some pointed out the fact that the advancements in aquaculture practices have enhanced the quality and food safety of farmed seafood, increasing its appeal to consumers. A distributor highlighted this improvement, saying, "…I think the quality and safety of farmed fish has improved…" (Distributor, 32, male). A recent survey among 3403 Chinese consumers indicated that more than half of the younger consumers of post-2000s generations perceived that farmed and wild-caught are equal [73].

3.2.6. Traceability and sustainability assurance

Informants highlighted that traceability is prioritized over sustainability assurance of the high-value imported aquatic food to ensure the safety and quality of the products. Traders and producers are under pressure to establish robust traceability systems to meet Chinese consumer demands, despite the limited penetration of international sustainability standards. As one importer pointed out, "…when the origin of the salmon is uncertain, it poses a significant challenge…so ensuring traceability is essential, as it ensures safety…" (Importer 2, 43, male). However, there are concerns about the inconsistency and opacity of traceability systems, which hinder conformity regarding the product's origin and production method. A previous study found that the majority of imported seafood (about 75 %) marketed from an e-commerce platform were inconsistent in terms of Web page and label descriptions, a further 35 % of the samples were inauthentic [74]. Further, the prevalence of grey trade, '*transporting aquatic food into mainland China through informal channels to avoid tariffs*' for much of the high-value aquatic food imported into China means that traceability is a significant challenge. By the time aquatic food reaches end users in mainland China, it has undergone numerous transactions, making it difficult to verify its origin. This issue is exacerbated by inadequate regulations for aquatic food traceability in China, where a standardized labelling system and an official list of aquatic food names are absent [75]. These challenges, however, may favour giant e-retailers who can bypass intermediaries and use their streamlined supply chains to market the quality, traceability, and desirability of their products more effectively and at lower cost through social media platforms to reach consumers.

Research has shown that blockchain technology can play a crucial role in improving food traceability, which in turns support to build consumer trust and promote sustainable practices [76–78]. Aligning trader practices with consumer expectations—especially around food safety and traceability—is essential for meeting growing demand [79]. Moreover, incorporating consumer insights on sustainability—such as their willingness to pay for verified traceability and sustainably sourced products—could provide actionable recommendations that further enhance marketability and consumer trust in agri-food products [77, 80].

In addition to these technological advancements, it is important to consider the relative importance of different sales channels for buying aquatic food in China. Wet markets have traditionally been a primary source of aquatic food, offering a wide variety of live and fresh options [81]. Supermarkets and retailers are also significant players, particularly in urban areas, providing a range of live, fresh, and frozen aquatic food products. However, salmon stands out as a high-value and premium product that, unlike other expensive seafood, does not need to be sold live to maintain its perceived quality and price. This unique attribute makes it especially well-suited to retail environments, where the convenience and variety of presentation formats, such as frozen and sashimi-grade options, align with consumer preferences and modern

shopping habits. E-commerce has seen rapid growth in recent years, driven by consumer convenience and the increased number of online platforms, which now offer extensive selections of aquatic food, including high-value imported aquatic food [4]. The shift towards supermarkets and e-commerce platforms is influencing the dynamics of aquatic food sales and traceability dynamics. Major retailers and e-commerce platforms often have more stringent quality control measures and traceability systems compared to wet markets. Consequently, aquatic food sold through these modern channels may be subject to better traceability practices, although challenges remain due to the complex supply chains [68] and grey trade activities [27]. Therefore, while traceability issues are pervasive, they may vary in severity across different sales channels. For instance, Xiong et al. [82] found that over 60 % of fish labelled as 'cod' (Xue鱈) in China were mislabelled. There is speculation that concerns about price inflation may also be a factor influencing the Chinese government's decision to tolerate the practice of grey trade [83].

Following the COVID-19 pandemic, and earlier food safety crises – such as the 2008 Chinese milk scandal [84], Chinese authorities have imposed stricter requirements for thorough documentation and verification processes, emphasising the importance of traceability for compliance with food safety. While food safety remains the primary driver of consumer trust, ecolabelling is beginning to gain traction, especially among younger and environmental conscious consumers. Regarding sustainability certification, informants noted that the majority of imported high-value aquatic food products from Western countries already possess an eco-label certification. However, some participants questioned the efficacy of eco-labelling and sustainability certifications in enhancing their business in China. As one importer remarked, "…ecolabel does not boost my business…I don't think Chinese buyers pay much attention to it…" (Importer 1, 39, male). It is worth considering whether the eco-label serves as a proxy for good governance and best practices in this context [85]. While some informants acknowledge the potential benefits of eco-labelling for branding, they also express doubts about its immediate influence on their business. These findings are in line with a previous study by Malcorps et al. [86] indicating that Chinese seafood trade shows had less of an emphasis on sustainability compared to that in Europe and the United States, but placed a greater emphasis on food safety and quality than on environmental concerns. However, the survey by the Global Seafood Alliance found that young consumers are aware of the environmental sustainability label (Best Aquaculture Practice) and that it positively influences their purchasing decisions [73]. Thus, while ecolabelling may currently play secondary role to food safety, it holds growing potential to shape purchasing behaviour as awareness of environmental sustainability continues to rise.

3.2.7. Trading and price

The dynamics of trading and pricing significantly impact the demand for aquatic food in China. Traders' perceptions about trading practices and price fluctuations shape consumer behaviour and preferences. When prices fluctuate due to changes in trading practices, Chinese consumers react by adjusting their buying habits. Chinese consumers display significant sensitivity to fluctuations in the aquatic food market, actively seeking the best deals and maximizing value for their expenditures. In general, price is a central influencing factor for aquatic food consumption behaviour globally, it plays an especially significant role among Asian consumers due to varying income levels and economic considerations [15]. One importer mentioned that "…some (consumers) are sensitive to price…when price increases, they select for more affordable choices or purchase smaller quantities of salmon…" (Importer 2, 39, male).

Moreover, government regulations and policies highly influence market stability and product availability, further shaping consumer demand. Changes in import regulations and tariffs, often influenced by decisions made by the Chinese government, can significantly impact the availability and pricing of salmon in China. For example, the free trade agreement signed on May 1, 2024, between China and Ecuador reduced shrimp tariffs from 5 % to 2 %, with plans to eliminate the tariff within 10 years [87]. This reduction will make shrimp more affordable in China's aquatic food market. Given that Ecuador is currently the top country from which China imports a high volume of shrimp & prawns, this agreement will have a substantial impact. A recent study by Song et al. [63] found that despite the increasing influence of non-state actors, China as a state actor is taking a more proactive role in shaping the seafood trade. The unique economic structure, government intervention, and strategic policies make China a distinct case where state actors and business interests are closely interacting in shaping international trade outcomes. This process is complex, subject to change over time, and entangled in a broad range of other economic and social institutions. One informant mentioned that geopolitical tensions and global economic conditions can also influence trade dynamics and market stability in China. For instance, seafood trade tensions between Norway and China between 2010 and 2016 were triggered by the awarding of the Nobel Peace Prize to Liu Xiaobo. China's state government responded with informal trade restrictions on Norwegian aquatic food, particularly salmon [88,89]). Adjustments in import tariffs or alterations to trade agreements between aquatic food exporting countries and China can influence the cost of products in the country, consequently affecting retail prices and affordability for domestic consumers. One salesperson remarked "…Norwegian salmon is facing competition from Chilean salmon…Chilean salmon has an advantage of lower import tariffs, making it more competitive in price and is driving market share…" Similarly, Zhang et al. [90] found that changes in the volatility (or variability) of salmon prices and exchange rates significantly affect the quantity of farmed salmon being imported.

3.3. Policy implications

Given the disruption of aquatic food imports during the COVID–19 pandemic, it is recommended that traders should have strong risk management plans in place to deal with such disruptions. For instance, maintaining adaptable logistics and broadening the supply base to enable switching source nations according to market conditions (for example, switching from Norway to the Faroe Islands or Scotland in the case of salmon) might be useful. Our recent study found that Chinese consumers could not differentiate the origin of salmon under blind conditions [91], suggesting that such logistical adjustments would not adversely affect consumer perception. With these strategies, importers can adjust their sourcing strategy and logistics in response to market conditions, improving their capacity to control currency and pricing risks. In the highly competitive aquatic food industry, this technique helps importers efficiently manage both price, exchange rate risks and logistics by enabling them to modify their sourcing strategy in response to market conditions even in crises. Zhang et al. [90] argue that depending on how successfully importers manage risks and the accessibility of hedging options, the effects of pricing versus exchange rate fluctuations on trade can differ. Fixed-price contracts and financial derivatives, for example, can assist lower the risks associated with high-value aquatic food prices, and different hedging tactics can help traders lessen the impact of exchange rate swings. Thus, it is recommended to strengthen connections with foreign producers and suppliers in Norway, Chile, Scotland, Australia, the United States, Canada, and the Faroe Islands to provide a steady supply chain for high-value aquatic species such as salmon, sea cucumbers, and lobsters. This will indeed fulfil customer demand and preserve market stability.

The demand for high-value aquatic species, along with the sustained importance of freshwater species like carp, and catfish reflects the diversification of consumer preferences. While carp, a traditional staple, continues to be widely consumed, more recently introduced species such as channel catfish (*Ictalurus punctatus*), which is produced domestically in large quantities, and Basa (*Pangasius bocourti*), which is imported in

larger quantities, have also gained popularity. This trend illustrates the evolving landscape of aquatic food consumption in the country, blending traditional and exotic species. Thus, it is recommended for importers to diversify product offers to meet a wide range of consumer demand. Increasing demand for convenient frozen aquatic food products due to the growth of e-commerce and supermarkets as well as the urban lifestyle of young consumers offers a substantial opportunity for distributors, processors and traders. Previous studies have found that imported products from another side of the globe can have comparable or in some cases smaller carbon footprint than domestic products, particularly, frozen and shipped, which may be the most energy efficient [92, 93]. Thus, promoting frozen imported aquatic food products can meet rising consumer demand while also offering an energy-efficient and environmentally friendly option compared to live or fresh imported or domestic products. Importers and distributors can use sales channels other than traditional wet markets such as supermarkets and e-commerce platforms for the sales of premium high-value imported frozen aquatic food to boost sales and promote easy accessibility. The fact that consumers are increasingly purchasing aquatic food products from supermarkets and online retailers in addition to traditional wet markets and food service sectors suggests a change in the retail environment. Thus, the use of digital marketing and enhancing social media engagement can increase brand awareness and loyalty, while digital marketing can help high-value imported aquatic foods reach a large customer base [94,95].

In the competitive aquatic food market of China, traders must ensure imported aquatic food products' quality and safety through recognisable safety certifications that comply with stringent inspection procedures. Emphasizing the country of origin in marketing materials can increase consumer trust in products originating from certain provenance with solid reputations for food safety and quality. Despite there being less emphasis on sustainability, promoting certifications like the Aquaculture Stewardship Council (ASC) and Marine Stewardship Council (MSC) can improve brand reputation. Previous studies have demonstrated that certification schemes not only enhance consumer trust but also shape broader market perceptions, positioning certified seafood products as higher-quality and more credible options [86,96]. These certifications have evolved from traditional ecolabels to comprise a broader range of issues, including environmental, and social impacts, as well as fish welfare. This comprehensive approach supports responsible aquatic food production [97]. To empower consumers to make informed choices and support sustainable practices, clear and accurate labelling is essential [98]. Public information campaigns can further enhance consumer awareness and influence behaviour towards sustainable aquatic food consumption. These campaigns are effective in motivating consumers to adopt sustainable practices voluntarily. According to Simões, [99], education and information are critical to many public initiatives, often supported by media communication and social marketing techniques. Such campaigns increase consumer awareness of certifications and help reduce the environmental footprint of consumption habits.

A critical component of maintaining quality and safety in the aquatic food supply chain is ensuring robust traceability. In particular, global supply chain traceability can be enhanced by reducing the number of nodes in the supply network and increasing vertical integration [100]. This is particularly relevant in the context of China's complex aquatic food import network, where longer supply chains with numerous nodes introduce multiple points of vulnerability. Implementing end-to-end traceability, akin to 'Farm to Fork' systems used in terrestrial agriculture, is recommended. This approach involves tracking products from their source through to the consumer, ensuring that the entire journey is transparent and verifiable.

The rise of digital technologies offers sophisticated tools for traceability, making it easier for consumers to access detailed product information [101]. For aquatic food products, full-chain digital traceability—comprehensive tracking of a product's path through the supply chain using advanced digital systems—becomes indispensable. This not only helps ensure that products are safe, legal, and sustainably sourced but also supports accurate labelling and consumer trust. Therefore, integrating strong traceability measures with certification and labelling efforts provides a comprehensive approach to ensuring the quality, safety, and sustainability of aquatic food products.

Finally, it is important to acknowledge the significant influence of Chinese state actors in the aquatic food trade. The Chinese government plays a central role in shaping the types of seafood imported into the country, as well as how these imports enter the domestic market. This is especially relevant given China's food safety policies and regulations, which often dictate the importation processes and quality standards for high-value aquatic food products. While discussing state actors' influence may be politically sensitive and challenging to address directly with traders, it remains a critical aspect of understanding the broader dynamics of the seafood trade. State policies and regulations regarding tariffs, certifications, and safety standards can significantly affect the availability and pricing of imported seafood. Therefore, Chinese policymakers and relevant state actors should work alongside both international and domestic stakeholders to ensure the development of transparent and effective trade policies that support food safety, sustainability, and the smooth functioning of the aquatic food import sector.

4. Conclusion

The COVID-19 pandemic temporarily reduced China's aquatic food imports, particularly from Europe, but trade rebounded sharply in 2022, with significant increases in the importation of high-value species like crustaceans from the Americas and continued diversification of consumer preferences. This study highlights significant shifts in aquatic food consumption patterns in China, driven by economic growth, urbanization, and heightened health awareness. The increasing demand for high-value imported species, such as salmon, lobster, abalone, and sea cucumber, among affluent urban consumers reflects a move towards more diverse and health-conscious diets. Key drivers of this demand include perceptions of quality and food safety, heavily influenced by cultural and social norms. The country of origin and traceability play pivotal roles in shaping consumer trust, as products from specific regions are perceived to have higher safety and quality standards. The findings also suggest that current trading practices, government policies, and economic factors strongly influence pricing, demand, and consumer behaviour toward high-value aquatic food.

However, sustainability remains a secondary concern, though interest in sustainable practices appears to be growing, particularly among younger consumers, indicating a critical opportunity to promote sustainable futures. By integrating sustainability into the supply chain, businesses and policymakers can contribute to a long-term vision of a more resilient and environmentally responsible trade system that aligns with global efforts to combat climate change and resource depletion.

The expansion of retail channels—from traditional wet markets to supermarkets and e-commerce platforms—demonstrates the evolving distribution landscape. These changes offer considerable growth opportunities for traders and distributors to access a broader consumer base by leveraging modern sales channels and prioritizing product quality, safety, and sustainability. To maintain competitiveness and meet the evolving demands of China's high-value aquatic food market, traders must adopt flexible sourcing strategies and engage in strategic marketing that emphasizes traceability, sustainability, and the potential to contribute to a sustainable future. Policymakers can further support these efforts by incentivizing sustainable sourcing practices, enhancing regulations, and ensuring that both economic growth and environmental stewardship remain central to the long-term sustainability of the aquatic food trade.

This paper makes a significant contribution to the literature on aquatic food trade and sustainability by exploring key informants, particularly trader perceptions and advocating for the integration of

sustainability into traceability efforts. The research provides valuable insights into the demand for high-value aquatic products imported into China, particularly in the context of global trade dynamics and growing concerns about sustainability and food security. By linking key informants' perceptions to issues of traceability and transparency, the study highlights a gap between market priorities and public sustainability objectives. The combined approach of secondary data analysis and interviews with key informants offers a robust methodology to explore this complex topic, making the research valuable for policymakers, industry stakeholders, and global discussions on sustainable aquatic food practices. Furthermore, the study's findings provide actionable recommendations that can guide current and future policies to ensure the sustainability of China's aquatic food trade and its alignment with global sustainability goals.

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CRediT authorship contribution statement

Mausam Budhathoki: Writing – original draft, Visualization, Validation, Software, Project administration, Methodology, Investigation, Formal analysis, Data curation, Conceptualization. **Hao Xu:** Investigation, Formal analysis, Data curation. **Yang Song:** Investigation, Formal analysis, Data curation. **Zixuan Ma:** Investigation, Formal analysis, Data curation. **Anyango Benter:** Investigation, Data curation. **Wenbo Zhang:** Writing – review & editing, Validation, Supervision, Resources, Methodology, Investigation, Formal analysis, Data curation. **Saihong Li:** Writing – review & editing, Validation, Methodology. **Richard Newton:** Writing – review & editing, Validation, Supervision. **Danny Campbell:** Writing – review & editing, Validation, Supervision. **David Little:** Writing – review & editing, Visualization, Validation, Supervision, Resources, Methodology, Funding acquisition, Conceptualization.

Declaration of competing interest

None.

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Supplementary materials

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Data availability

Data will be made available on request.

References

[1] C. Emsden, FAO Foresees a Stable Outlook for Most Food Commodity Markets in 2024/25, Food and Agriculture Organization, 2024. https://www.fao.org/newsroom/detail/fao-foresees-a-stable-outlook-for-most-food-commodity-markets-in-2024-25/en.

[2] In Brief to The State of World Fisheries and Aquaculture 2024. (2024). FAO. https://doi.org/10.4060/cd0690en.

[3] F. Asche, M.F. Bellemare, C. Roheim, M.D. Smith, S. Tveteras, Fair enough? Food security and the International trade of seafood, World Dev. 67 (2015) 151–160, https://doi.org/10.1016/j.worlddev.2014.10.013.

[4] Budhathoki, M., Lincen, L., Xu, H., Zhang, W., Li, S., Newton, R., Campbell, D., & Little, D. (2024). *Understanding farmed salmon imports and e-commerce consumer satisfaction in China: a text mining approach*.

[5] T. Garlock, F. Asche, J. Anderson, T. Bjørndal, G. Kumar, K. Lorenzen, A. Ropicki, M.D. Smith, R. Tveterås, A global blue revolution: aquaculture growth across regions, species, and countries, Rev. Fisher. Sci. Aquac. 28 (1) (2020) 107–116, https://doi.org/10.1080/23308249.2019.1678111.

[6] F. Natale, A. Borrello, A. Motova, Analysis of the determinants of international seafood trade using a gravity model, Mar. Policy 60 (2015) 98–106, https://doi.org/10.1016/j.marpol.2015.05.016.

[7] S. Tveterås, F. Asche, M.F. Bellemare, M.D. Smith, A.G. Guttormsen, A. Lem, K. Lien, S. Vannuccini, Fish is food—The FAO's Fish price index, PLoS One 7 (5) (2012) e36731, https://doi.org/10.1371/journal.pone.0036731.

[8] FAO, Towards Blue Transformation, FAO, 2022, https://doi.org/10.4060/cc0461en.

[9] T. Reardon, D. Tschirley, M. Dolislager, J. Snyder, C. Hu, S. White, Urbanization, Diet Change, and Transformation of Food Supply Chains in Asia, Global Center for Food Systems Innovation, Michigan, 2014, p. 46.

[10] R.A. Watson, R. Nichols, V.W.Y. Lam, U.R. Sumaila, Global seafood trade flows and developing economies: insights from linking trade and production, Mar. Policy 82 (2017) 41–49, https://doi.org/10.1016/j.marpol.2017.04.017.

[11] J.K. Abbott, D. Willard, J. Xu, Feeding the dragon: the evolution of China's fishery imports, Mar. Policy 133 (2021), https://doi.org/10.1016/j.marpol.2021.104733. Scopus.

[12] China Fishery Yearbook, China Fishery Statistical Yearbook, China Agriculture Press, 2022.

[13] O. Wang, S. Somogyi, Motives for luxury seafood consumption in first-tier cities in China, Food. Qual. Prefer. 79 (2020) 103780, https://doi.org/10.1016/j.foodqual.2019.103780.

[14] F. Asche, B. Yang, J.A. Gephart, M.D. Smith, J.L. Anderson, E.V. Camp, T. M. Garlock, D.C. Love, A. Oglend, H.-M. Straume, China's seafood imports—Not for domestic consumption? Science 375 (6579) (2022) 386–388, https://doi.org/10.1126/science.abl4756.

[15] M. Budhathoki, D. Campbell, B. Belton, R. Newton, S. Li, W. Zhang, D. Little, Factors influencing consumption behaviour towards aquatic food among Asian consumers: a systematic scoping review, Foods 11 (24) (2022) 4043, https://doi.org/10.3390/foods11244043.

[16] J.A. Gephart, M.L. Pace, Structure and evolution of the global seafood trade network, Environ. Res. Lett. 10 (12) (2015) 125014.

[17] U.R. Sumaila, D. Zeller, L. Hood, M. Palomares, Y. Li, D. Pauly, Illicit trade in marine fish catch and its effects on ecosystems and people worldwide, Sci. Adv. 6 (9) (2020) eaaz3801.

[18] K. Zhao, S.D. Gaines, J. García Molinos, M. Zhang, J. Xu, Effect of trade on global aquatic food consumption patterns, Nat. Commun. 15 (1) (2024) 1412, https://doi.org/10.1038/s41467-024-45556-w.

[19] M. Budhathoki, S. Tunca, R.L. Martinez, W. Zhang, S. Li, B. Le Gallic, K. Brunsø, P. Sharma, P. Eljasik, G. Gyalog, R. Panicz, D. Little, Societal perceptions of aquaculture: combining scoping review and media analysis, Rev. Aquacult. (2024), https://doi.org/10.1111/raq.12927 raq.12927.

[20] M. Godfrey, China's Domestic Salmon Sector Facing Pressure from Bad economy, Norwegian imports, SeafoodSource, 2020. https://www.seafoodsource.com/news/supply-trade/chinas-domestic-salmon-sector-facing-pressure-from-bad-economy-norwegian-imports.

[21] Research and Markets, China research report of the imported salmon Industry 2020. GlobalNewsWire, 2020. https://www.globenewswire.com/news-release/2020/07/28/2068373/0/en/China-Research-report-of-the-Imported-Salmon-Industry-2020.html. #:~:text=According%20to%20the%20analyst%2C%20domestic,in%20China%20relies%20on%20imports.

[22] B. Belton, T. Reardon, D. Zilberman, Sustainable commoditization of seafood, Nature Sustain. 3 (9) (2020) 677–684, https://doi.org/10.1038/s41893-020-0540-7.

[23] European Commission. (2022). Policy: common fisheries policy, integrated maritime policy, aquaculture policy. *2022*. https://oceans-and-fisheries.ec.europa.eu/policy_en.

[24] J. Bostock, B. McAndrew, R. Richards, K. Jauncey, T. Telfer, K. Lorenzen, D. Little, L. Ross, N. Handisyde, I. Gatward, R. Corner, Aquaculture: global status and trends, Philosophical. Trans. Royal. Society B: Biolog. Sci. 365 (1554) (2010) 2897–2912, https://doi.org/10.1098/rstb.2010.0170.

[25] B. Crona, E. Wassenius, M. Troell, K. Barclay, T. Mallory, M. Fabinyi, W. Zhang, V.W. Lam, L. Cao, P.J. Henriksson, China at a crossroads: an analysis of China's changing seafood production and consumption, One Earth 3 (1) (2020) 32–44.

[26] A. Pounds, A.M. Kaminski, M. Budhathoki, O. Gudbrandsen, B. Kok, S. Horn, W. Malcorps, A.-A. Mamun, A. McGoohan, R. Newton, R. Ozretich, D.C. Little, More than fish—Framing aquatic animals within sustainable food systems, Foods 11 (10) (2022) 1413, https://doi.org/10.3390/foods11101413.

[27] M. Fabinyi, K. Barclay, H. Eriksson, Chinese trader perceptions on sourcing and consumption of endangered seafood, Front. Mar. Sci. 4 (JUN) (2017), https://doi.org/10.3389/fmars.2017.00181. Scopus.

[28] M.P. O'Malley, K.A. Townsend, P. Hilton, S. Heinrichs, J.D. Stewart, Characterization of the trade in manta and devil ray gill plates in China and

South-east Asia through trader surveys, Aquatic Conserv.: Marine Freshwater Ecosystems 27 (2) (2017) 394–413, https://doi.org/10.1002/aqc.2670. Scopus.
[29] S. Kvale, *Doing Interviews* (Reprint), SAGE, 2010.
[30] M. Fabinyi, N. Liu, Seafood banquets in Beijing: consumer perspectives and implications for environmental sustainability, Conserv. Society 12 (2) (2014) 218–228, https://doi.org/10.4103/0972-4923.138423. Scopus.
[31] M. Fabinyi, N. Liu, Social trust and luxury seafood banquets in contemporary Beijing, Asian Anthropol 13 (2) (2014) 92–105.
[32] C. Kehoe, M. Marschke, W. Uttamamunee, J. Kittitornkool, P. Vandergeest, Developing local sustainable seafood markets: a Thai example, World Food Policy 2–3 (2–1) (2016) 32–50, https://doi.org/10.18278/wfp.2.2.3.1.3.
[33] S. Li, W. Hope, Terminology Translation in Chinese Contexts: Theory and Practice, Routledge, 2021.
[34] L. Sechrest, T.L. Fay, S.M.H. Zaidi, Problems of translation in cross-cultural research, J. Cross. Cult. Psychol. 3 (1) (1972) 41–56, https://doi.org/10.1177/002202217200300103.
[35] A. Squires, Methodological challenges in cross-language qualitative research: a research review, Int. J. Nurs. Stud. 46 (2) (2009) 277–287, https://doi.org/10.1016/j.ijnurstu.2008.08.006.
[36] N.K. Gale, G. Heath, E. Cameron, S. Rashid, S. Redwood, Using the framework method for the analysis of qualitative data in multi-disciplinary health research, BMC Med. Res. Methodol. 13 (2013) 1–8.
[37] M. Budhathoki, A. Zolner, T. Nielsen, H.C. Reinbach, The role of production method information on sensory perception of smoked salmon-A mixed-method study from Denmark, Food. Qual. Prefer. (2021) 94, https://doi.org/10.1016/j.foodqual.2021.104325.
[38] J.L. Anderson, F. Asche, T. Garlock, J. Chu, Aquaculture: its role in the future of food. World Agricultural Resources and Food Security: International Food Security, Emerald Publishing Limited, 2017, pp. 159–173.
[39] F. Asche, C.A. Roheim, M.D. Smith, Trade intervention: not a silver bullet to address environmental externalities in global aquaculture, Mar. Policy 69 (2016) 194–201.
[40] C.A. Roheim, D. Zhang, Sustainability certification and product substitutability: evidence from the seafood market, Food Policy 79 (2018) 92–100, https://doi.org/10.1016/j.foodpol.2018.06.002. Scopus.
[41] R. Chen, T. Li, Y. Li, Analyzing the impact of COVID-19 on consumption behaviors through recession and recovery patterns, Sci. Rep. 14 (1) (2024) 1678, https://doi.org/10.1038/s41598-024-51215-3.
[42] Godfrey, M. (2024a). *China's shrimp market poised for change as free trade deal with Ecuador kicks in*. https://www.seafoodsource.com/news/supply-trade/china-s-shrimp-market-poised-for-change-as-free-trade-deal-with-ecuador-kicks-in.
[43] R. Newton, W. Zhang, Z. Xian, B. McAdam, D.C. Little, Intensification, regulation and diversification: the changing face of inland aquaculture in China, Ambio 50 (2021) 1739–1756.
[44] Food and Agriculture Organization. (2023). *Pangasius well positioned to satisfy increased demand* (Information and Analysis on Markets and Trade of Fisheries and Aquaculture Products) [Globefish]. https://www.fao.org/in-action/globefish/market-reports/resource-detail/en/c/1633532/.
[45] M. Fabinyi, N. Liu, The social context of the Chinese food system: an ethnographic study of the Beijing seafood market, Sustain. (Switzerland) 8 (3) (2016), https://doi.org/10.3390/su8030244. Scopus.
[46] Fabinyi, M. (2018). *The Chinese seafood market: opportunities and challenges for Australian exporters*.
[47] H. Zhang, C. Sun, Z. Wang, B. Che, Seafood consumption patterns and affecting factors in urban China: a field survey from six cities, Aquac. Reports 19 (2021), https://doi.org/10.1016/j.aqrep.2021.100608. Scopus.
[48] J. Milošević, I. Žeželj, M. Gorton, D. Barjolle, Understanding the motives for food choice in Western Balkan countries, Appetite 58 (1) (2012) 205–214, https://doi.org/10.1016/j.appet.2011.09.012.
[49] E.B. Rimm, L.J. Appel, S.E. Chiuve, L. Djoussé, M.B. Engler, P.M. Kris-Etherton, D. Mozaffarian, D.S. Siscovick, A.H. Lichtenstein, Seafood long-chain n-3 polyunsaturated fatty acids and cardiovascular disease: a science advisory from the American Heart Association, Circulation 138 (1) (2018) e35–e47.
[50] N.T. Thong, H.S. Solgaard, Consumer's food motives and seafood consumption, Food. Qual. Prefer. 56 (2017) 181–188, https://doi.org/10.1016/j.foodqual.2016.10.008.
[51] W. Xu, B. Hu, Research on China's aquatic product price fluctuation-analysis of background factors based on consumption ratcheting and fishery transformation, Price: Theory & Practice 2 (2019) 72–75.
[52] A. Zhang, A comparative study on consumption demand of Chinese and American aquatic products and its implications, J. Ocean Univ. China (Soc. Sci.) 5 (2018) 77–84.
[53] J.-J. Geng, H. Li, J.-P. Liu, Y. Yang, Z.-L. Jin, Y.-N. Zhang, M.-L. Zhang, L.-Q. Chen, Z.-Y. Du, Nutrients and contaminants in tissues of five fish species obtained from Shanghai markets: risk–benefit evaluation from human health perspectives, Sci. Total Environ. 536 (2015) 933–945, https://doi.org/10.1016/j.scitotenv.2015.06.057.
[54] Q. Nong, H. Dong, Y. Liu, L. Liu, B. He, Y. Huang, J. Jiang, T. Luan, B. Chen, L. Hu, Characterization of the mercury-binding proteins in tuna and salmon sashimi: implications for health risk of mercury in food, Chemosphere 263 (2021) 128110, https://doi.org/10.1016/j.chemosphere.2020.128110.
[55] B. Chen, X. Chen, L. Shi, Estimating Chinese consumer's willingness to pay for aquatic food following Japan's discharge of radioactive wastewater, Aquaculture 577 (2023), https://doi.org/10.1016/j.aquaculture.2023.739990. Scopus.
[56] C. Liu, J. Chen, Consuming takeaway food: convenience, waste and Chinese young people's urban lifestyle, J. Consumer Culture 21 (4) (2021) 848–866.
[57] Feedr. (2024). *Meat Price index in GPB*. https://feedr.co/en-gb/meat-price-index.
[58] T. Meng, C. Wang, W.J. Florkowski, Z. Yang, Determinants of urban consumer expenditure on aquatic products in Shanghai, China, Aquac. Econ. Manag. 27 (1) (2023) 1–24.
[59] F. Wang, J. Zhang, W. Mu, Z. Fu, X. Zhang, Consumers' perception toward quality and safety of fishery products, Beijing, China, Food Control 20 (10) (2009) 918–922.
[60] R. Taylor, China's growing consumer culture: implications for marketing strategy. The Globalization of Chinese Business, Elsevier, 2014, pp. 205–225.
[61] X. Pu, Q. Jiang, B. Fan, Chinese public opinion on Japan's nuclear wastewater discharge: a case study of Weibo comments based on a thematic model, Ocean. Coast. Manag. 225 (2022) 106188, https://doi.org/10.1016/j.ocecoaman.2022.106188.
[62] H. Kendall, S. Kuznesof, M. Dean, M.-Y. Chan, B. Clark, R. Home, H. Stolz, Q. Zhong, C. Liu, P. Brereton, L. Frewer, Chinese consumer's attitudes, perceptions and behavioural responses towards food fraud, Food Control 95 (2019) 339–351, https://doi.org/10.1016/j.foodcont.2018.08.006.
[63] A.Y. Song, M. Fabinyi, K. Barclay, China and seafood trade after coronavirus: the role of state actors, Mar. Policy 160 (2024) 105992, https://doi.org/10.1016/j.marpol.2023.105992.
[64] M. Fabinyi, Historical, cultural and social perspectives on luxury seafood consumption in China, Environ. Conserv. 39 (1) (2012) 83–92.
[65] O. Wang, S. Somogyi, R. Ablett, General image, perceptions and consumer segments of luxury seafood in China: a case study for lobster, British Food J. 120 (5) (2018) 969–983, https://doi.org/10.1108/BFJ-07-2017-0379. Scopus.
[66] T. Jacka, A.B. Kipnis, S. Sargeson, Contemporary China: Society and Social Change, Cambridge University Press, 2013.
[67] P. Corvo, R. Migliavada, D.M. Zocchi, New food and restaurant trends, C. Facioni, G. Di Francesco, & P. Corvo, Italian Studies on Food and Quality of Life 85 (2022) 39–55, https://doi.org/10.1007/978-3-030-97806-8_3.
[68] X. Zhang, T. Lara, Z. Sun, Y. Li, J. Guo, W. Deng, Y. Chen, A. He, H. Peng, A. Armani, Labelling compliance assessment and molecular authentication of Grilled Fish products sold on Chinese e-commerce: traceability issues related to the use of umbrella trade names, Food Control 155 (2024) 110043.
[69] X. Liang, S. Yang, Z. Lou, A. Ali, The impact of Japan's discharge of nuclear-contaminated water on aquaculture production, trade, and food security in China and Japan, Sustainability 16 (3) (2024) 1285, https://doi.org/10.3390/su16031285.
[70] Godfrey, M. (2024b). *Chinese consumer protection activist issues warning about glazing additive used on Ecuadorian shrimp*. https://www.seafoodsource.com/news/food-safety-health/chinese-consumer-protection-activist-issues-warning-about-glazing-additive-used-on-ecuadorian-shrimp.
[71] Global Food mate, China lifted import ban on shrimp products from nine Ecuadorian factories, Food Safety Compliance Service (2024). https://global.foodmate.net/news/showt-12207-China-lifted-import-ban-on-shrimp-products-from-nine-Ecuadorian-factories.html.
[72] Q. Zheng, H.H. Wang, J.F. Shogren, Fishing or aquaculture? Chinese consumers' stated preference for the growing environment of salmon through a choice experiment and the consequentiality effect, Marine Resou. Econ. 36 (1) (2021) 23–42.
[73] H. Xu, T. Wu, M. Budhathoki, D.S. Fang, W. Zhang, X. Wang, Consumption patterns and willingness to pay for sustainable aquatic food in China, Foods 13 (15) (2024) 2435, https://doi.org/10.3390/foods13152435.
[74] X. Xiong, F. Yuan, M. Huang, M. Cao, X. Xiong, Comparative evaluation of web page and label presentation for imported seafood products sold on Chinese E-commerce platform and molecular identification using DNA barcoding, J. Food Prot. 83 (2) (2020) 256–265, https://doi.org/10.4315/0362-028X.JFP-19-309.
[75] X. Xiong, P. D'Amico, L. Guardone, L. Castigliego, A. Guidi, D. Gianfaldoni, A. Armani, The uncertainty of seafood labeling in China: a case study on cod, Salmon and tuna, Mar. Policy 68 (2016) 123–135.
[76] T.K. Dasaklis, T.G. Voutsinas, G.T. Tsoulfas, F. Casino, A systematic literature review of blockchain-enabled supply chain traceability implementations, Sustainability 14 (4) (2022) 2439, https://doi.org/10.3390/su14042439.
[77] M. Fiore, M. Frem, M. Mongiello, F. Bozzo, C. Montemurro, G. Tricarico, A. Petrontino, Blockchain-based food traceability in Apulian marketplace: improving sustainable agri-food consumers perception and trust, Int. Technol. Letters (2024) e503, https://doi.org/10.1002/itl2.503.
[78] M. Fiore, M. Mongiello, Blockchain technology to support agri-food supply chains: a comprehensive review, IEEE Access 11 (2023) 75311–75324, https://doi.org/10.1109/ACCESS.2023.3296849.
[79] M.M. Aung, Y.S. Chang, Traceability in a food supply chain: safety and quality perspectives, Food Control 39 (2014) 172–184, https://doi.org/10.1016/j.foodcont.2013.11.007.
[80] G. Zhao, S. Liu, C. Lopez, H. Lu, S. Elgueta, H. Chen, B.M. Boshkoska, Blockchain technology in agri-food value chain management: a synthesis of applications, challenges and future research directions, Comput. Ind. 109 (2019) 83–99, https://doi.org/10.1016/j.compind.2019.04.002.
[81] S. Zhong, M. Crang, G. Zeng, Constructing freshness: the vitality of wet markets in urban China, Agric Human Values 37 (1) (2020) 175–185, https://doi.org/10.1007/s10460-019-09987-2.
[82] X. Xiong, L. Guardone, A. Giusti, L. Castigliego, D. Gianfaldoni, A. Guidi, A. Andrea, DNA barcoding reveals chaotic labeling and misrepresentation of cod (鳕, Xue) products sold on the Chinese market, Food Control 60 (2016) 519–532, https://doi.org/10.1016/j.foodcont.2015.08.028.
[83] B. Edwards, S. Waldron, C. Brown, J. Longworth, The Sino-Australia Cattle and Beef Relationship, The Australia-China Relations Institute, 2016. https://www.

australiachinarelations.org/sites/default/files/1608%20ACRI%20Publication%20-%20The%20Sino-Australian%20Cattle%20and%20Beef%20Relationship_web.pdf.
[84] C. Xiu, K.K. Klein, Melamine in milk products in China: examining the factors that led to deliberate use of the contaminant, Food Policy 35 (5) (2010) 463–470, https://doi.org/10.1016/j.foodpol.2010.05.001.
[85] K. Barclay, A. Miller, The Sustainable Seafood Movement Is a Governance Concert, with the Audience Playing a Key Role, Sustainability 10 (1) (2018) 180, https://doi.org/10.3390/su10010180.
[86] W. Malcorps, R.W. Newton, S. Maiolo, M. Eltholth, C. Zhu, W. Zhang, S. Li, M. Tlusty, D.C. Little, Global seafood trade: insights in sustainability messaging and claims of the major producing and consuming regions, Sustainability 13 (21) (2021) 11720, https://doi.org/10.3390/su132111720.
[87] The State Council Information Office The People's Republic of China, *China-Ecuador Free Trade Agreement to Take Effect On May 1*. Xinhua, 2024.
[88] X. Chen, R.J. Garcia, Economic sanctions and trade diplomacy: sanction-busting strategies, market distortion and efficacy of China's restrictions on Norwegian salmon imports, China Inf. 30 (1) (2016) 29–57.
[89] I. Kolstad, Too big to fault? Effects of the 2010 Nobel Peace Prize on Norwegian exports to China and foreign policy, Int. Polit. Sci. Rev. 41 (2) (2020) 207–223, https://doi.org/10.1177/0192512118808610. Scopus.
[90] D. Zhang, Y. Fang, Y. Liu, Import demand under price and exchange-rate uncertainties: the case of U.S. Atlantic salmon imports, Aquaculture 574 (2023) 739712, https://doi.org/10.1016/j.aquaculture.2023.739712.
[91] Budhathoki, M., Xu, H., Ma, Z., Campbell, D., Zhang, W., Li, S., Newton, R., & Little, D. (2024). *Consumers' preferences towards farmed salmon in China: integrating sensory and choice experiments*.
[92] A.K. Farmery, C. Gardner, B.S. Green, S. Jennings, R.A. Watson, Domestic or imported? An assessment of carbon footprints and sustainability of seafood consumed in Australia, Environ. Sci. Policy 54 (2015) 35–43, https://doi.org/10.1016/j.envsci.2015.06.007.
[93] M.F. Tlusty, K. Lagueux, Isolines as a new tool to assess the energy costs of the production and distribution of multiple sources of seafood, J. Clean. Prod. 17 (3) (2009) 408–415.
[94] R. Dolan, J. Conduit, C. Frethey-Bentham, J. Fahy, S. Goodman, Social media engagement behavior: a framework for engaging customers through social media content, Eur. J. Mark. 53 (10) (2019) 2213–2243.
[95] Z.R. Santos, C.M.K. Cheung, P.S. Coelho, P. Rita, Consumer engagement in social media brand communities: a literature review, Int. J. Inf. Manage. 63 (2022) 102457, https://doi.org/10.1016/j.ijinfomgt.2021.102457.
[96] J. Cantillo, J.C. Martín, C. Román, Determinants of fishery and aquaculture products consumption at home in the EU28, Food Qual. Prefer. 88 (2021) 104085, https://doi.org/10.1016/j.foodqual.2020.104085.
[97] M.E. Rector, R. Filgueira, M. Bailey, T.R. Walker, J. Grant, Sustainability outcomes of aquaculture eco-certification: challenges and opportunities, Rev. Aquacul. 15 (2) (2023) 840–852.
[98] M. Budhathoki, A. Zølner, T. Nielsen, M.A. Rasmussen, H.C. Reinbach, Intention to buy organic fish among Danish consumers: application of the segmentation approach and the theory of planned behaviour, Aquaculture 549 (2022) 737798, https://doi.org/10.1016/j.aquaculture.2021.737798.
[99] F. Simões, Consumer behavior and sustainable development in China: the role of behavioral sciences in environmental policymaking, Sustainability 8 (9) (2016) 897, https://doi.org/10.3390/su8090897.
[100] C.R. Hopkins, S.I. Roberts, A.J. Caveen, C. Graham, N.M. Burns, Improved traceability in seafood supply chains is achievable by minimising vulnerable nodes in processing and distribution networks, Mar. Policy 159 (2024) 105910, https://doi.org/10.1016/j.marpol.2023.105910.
[101] J. Astill, R.A. Dara, M. Campbell, J.M. Farber, E.D. Fraser, S. Sharif, R.Y. Yada, Transparency in food supply chains: a review of enabling technology solutions, Trends Food Sci. Technol. 91 (2019) 240–247.