Consumer awareness on sustainable seafood in Hong Kong's supermarkets: current status and potential drivers

Supplementary Information

Part I: tables and figures

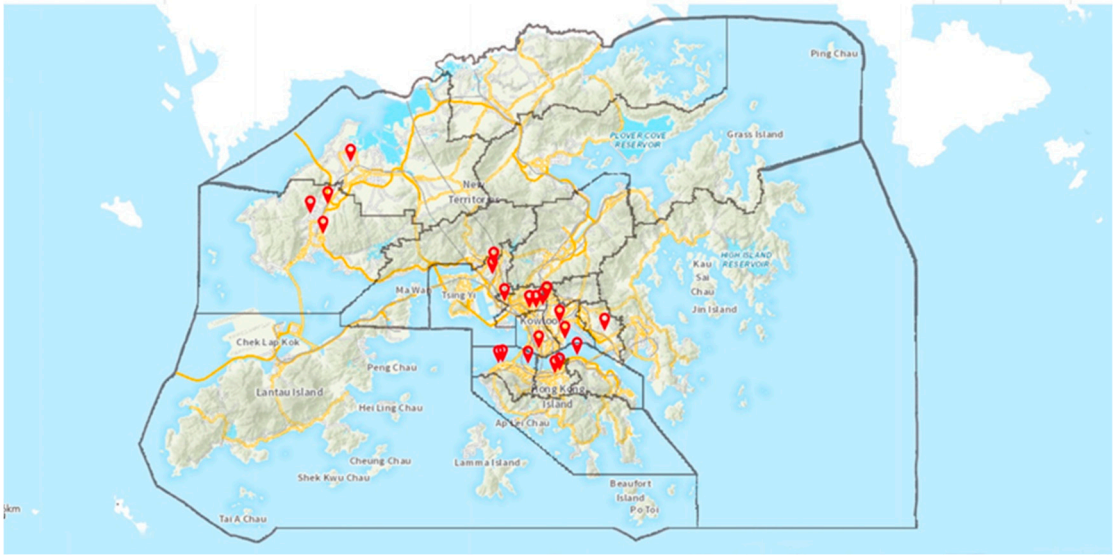


Figure S1. Distribution of the surveyed supermarkets in Hong Kong. In total 21 shops of various supermarkets were selected across the territory: four in Tuen Mun, three in Admiralty, one in Causeway Bay, one in Kowloon Tong, two in Mei Foo, five in Sham Shui Po, two in Tsim Sha Tsui, and three near Kennedy Town (see Table S2 for detail locations).



Figure S2. Example collaboration between an NGO (WWF-Hong Kong) and a high-end supermarket in promoting sustainable seafood (in one of the surveyed city'super supermarkets). A plaque with sustainable seafood label and production methods, in both English and Chinese, was established to introduce the product.



Figure S3. Examples of ecolabelled seafood products during the market surveys in high- (upper panel) and mid-end (lower panel) supermarkets. No ecolabelled seafood were found in low-end supermarkets.

Table S1. Examples of ecolabels for sustainable seafood, their sources of production and website links for relevant standards.

Ecolabel	Source(s) of production	Website link
Marine Stewardship Council (MSC)	Wild fisheries	https://www.msc.org/standards-and-certification/the-msc-standards
Aquaculture Stewardship Council (ASC)	Aquaculture	https://asc-aqua.org/producers/asc-standards/
Best Aquaculture Practices (BAP)	Aquaculture	https://www.bapcertification.org/Standards
Friend of the Sea	Wild fisheries, Aquaculture	https://friendofthesea.org/find-certification-bodies/
Dolphin-Safe Certification	Wild tuna fisheries	https://www.fisheries.noaa.gov/national/marine-mammal-protection/dolphin-safe-certification

Table S2. Locations of the surveyed supermarkets. In the "Grade" column, "L" = "Low-end"; "M" = "Mid-end" and "H" = "High-end". Survey dates are expressed in dd.mm.yyyy. For each supermarket, three shops were haphazardly selected within residential or urban areas in Hong Kong for the questionnaire survey ($\sum$ n = 3 (grades) × 2 – 3 (supermarkets) × 3 (shops) = 21). Market survey column denotes the shops sampled for frozen seafood surveys, in addition to questionnaire surveys.

Grade	Supermarket	Survey date	Market survey	Shop address
L	759 Store	25.06.2023	√	Metropolis Shopping Centre, Tuen Lee Street, Tuen Mun District
L	759 Store	19.07.2023	√	G/F, Nam Lok House, Nam Shan Estate, Tai Hang Tung Road, Sham Shui Po District
L	759 Store	21.07.2023	√	1/F, Tin Shing Shopping Centre, Tin Jing Street, Tin Shui Wai, Yuen Long District
L	Kai Bo Food	02.07.2023	√	G/F, Chester Court, Kennedy Town New Praya, Kennedy Town, Central and Western District
L	Kai Bo Food	14.07.2023		G/F, Broadway, Mei Foo Sun Chuen, Mei Foo, Kwai Chung District
L	Kai Bo Food	26.07.2023		G/F, Venice Gardens, Leung Tak Street, Tuen Mun District
M	Wellcome	02.07.2023	√	Great George Street, Causeway Bay, Wan Chai District
M	Wellcome	30.06.2023	√	G/F, Kwai Chung Shopping Centre, Kwai Chung Estate, Kwai Chung District
M	Wellcome	28.06.2023	√	Rondall Building, Tai Po Road, Tai Kok Tsui, Yau Tsim Mong District
M	PARKnSHOP	24.06.2023	√	2/F, Fu Tai Shopping Centre, Tuen Kwai Road, Tuen Mun District
M	PARKnSHOP	28.06.2023	√	B1, Dragon Centre, Yen Chow Street, Sham Shui Po District
M	PARKnSHOP	08.07.2023	√	G/F, Cheung Fat Industrial Building, Hill Road, Shek Tong Tsui, Western District
H	YATA	08.07.2023	√	B1, Phase 2, The North Point, Java Road, North Point, Eastern District
H	YATA	09.07.2023	√	LG, Millennium City Phase 5 (APM), Kwun Tong Road, Kwun Tong District
H	YATA	14.07.2023		L4, Metroplaza, Hing Fong Road, Kwai Fong, Kwai Chung District
H	TASTE	27.06.2023	√	G/F, Festival Walk, Tat Chee Avenue, Kowloon Tong, Kowloon City District
H	TASTE	05.07.2023	√	1/F, Commercial Podium, Whampoa Garden, Whampoa Street, Hung Hom, Kowloon City District
H	TASTE	05.07.2023	√	1/F, Celestial Place, Celestial Heights, Sheung Shing Street, Ho Man Tin, Kowloon City District
H	city'super	04.07.2023	√	L1, ifc Mall, Finance Street, Central, Central and Western District
H	city'super	04.07.2023	√	Harbor City, Canton Road, Tsim Sha Tsui, Yau Tsim Mong District
H	city'super	01.07.2023	√	B1, Times Square, Causeway Bay, Wan Chai District

Table S3. Reliability analyses (in terms of Cronbach's alpha) of the questionnaire questions used to investigate consumer traits on sustainable seafood in Hong Kong supermarkets. Reliability was measured for questions related to attitude, behaviour and in combination of the two dimensions.

Dimension	Cronbach's α	Number of questions
Attitude	0.836	3 (Questions 11 to 13 in Part Two)
Behaviour	0.789	3 (Questions 14 to 16 in Part Two)
Total	0.857	6

Table S4. Distributions of responses (in terms of percentages) of respondents surveyed in each of the low-, mid- and high-end supermarkets, for Question 1 and Questions 8 to 16 of the questionnaire (see Part II of this Supplementary Information for the questionnaire).

	Percentage of response (%) within different grades of supermarkets		
Question	**Low**	**Mid**	**High**
1. Age group			
18-24.	7	35	32
25-34.	5	36	41
35-44.	9	16	17
45-54.	62	6	12
55-64.	15	5	2
65-74.	3	3	0
8. How much difference in price would you like to pay for sustainable seafood as compared to regular seafood?			
-10%.	21	5	8
-5%.	17	6	6
0%.	22	33	18
5%.	30	39	52
10%.	10	18	15
9. Which of the following options most accurately describes sustainable seafood?			
Wild seafood that can be sustainably caught and traced back to its source.	30	19	17
Seafood caught or cultured in a way that avoids harming the environment.	37	35	40
Seafood that meets responsible aquaculture practices.	12	18	9
Harvested or cultured seafood in accordance with sustainable development strategy	22	28	34
10. Choose from the following descriptions that you think are relevant to sustainable seafood			
Highly priced seafood.	12	3	5
Seafood harvested by environmentally friendly fishing methods.	69	80	79
Seafood caught during the fishing moratorium.	13	7	6
All seafood from aquaculture.	5	8	7
Endangered species caught from the wild.	1	2	3
11. Level of preference for sustainable seafood?			

Extremely not preferring.	7	1	1
Not preferring.	10	0	1
Normal.	61	66	64
Preferring.	18	28	30
Extremely preferring.	4	5	4
12. Will you actively seek information on sustainable seafood?			
Extremely unwilling.	5	0	1
Unwilling.	10	4	2
Neutral attitude.	58	65	63
Willing.	22	26	32
Very willing.	4	5	3
13. Would you recommend sustainable seafood to your friends and relatives?			
Extremely unwilling.	3	0	1
Unwilling.	10	3	1
Neutral attitude.	54	51	49
Willing.	27	39	48
Very willing.	5	7	2
14. On average, how often do you purchase sustainable seafood from supermarkets within every 3 months?			
Never.	37	44	40
Rarely (1-3 times).	38	43	44
Sometimes (4-6 times).	19	10	14
Often (7-9 times).	6	3	1
Always (10 times or above).	0	0	1
15. Are you willing to spend time to look for sustainable seafood?			
Extremely unwilling.	4	0	1
Unwilling.	19	11	6
Neutral attitude.	53	53	56
Willing.	21	32	36
Very willing.	3	4	2
16. When you are purchasing seafood (sustainable and regular), are you willing to prioritize sustainable seafood?			
Extremely unwilling.	3	0	0
Unwilling.	20	3	2
Neutral attitude.	45	44	42
Willing.	28	48	50
Very willing.	4	5	6

Table S5. Price per unit weight of selected sustainable and ordinary frozen seafood products of the same category in high- and mid-end supermarkets. Sample size ranges from 1 – 12 for each average price (1 – 12 for ordinary and 1 – 3 for sustainable seafood). The type of ecolabel is also indicated for each product category. For "Clam" category in the mid-end supermarkets, the sustainable (ASC) average price includes both raw (0.08 HKD/g) and boiled (17.5 HKD/g) clams.

Supermarket grade	**Category**	**Ordinary seafood Average price/weight (HKD/g)**	**Sustainable seafood Average price/weight (HKD/g)**	**Ecolabel**
High-end	Clam	0.15 (n=2)	0.04 (n=1)	MSC
High-end	Halibut	0.15 (n=3)	0.45 (n=1)	BAP
High-end	Oyster	0.16 (n=3)	0.13 (n=1)	BAP
High-end	Patagonian toothfish	0.66 (n=3)	0.96 (n=3)	MSC, BAP
High-end	Salmon	0.31 (n=12)	0.42 (n=1)	MSC
High-end	Shrimp	1.24 (n=2)	0.11 (n=1)	BAP
High-end	Yesso scallop	0.26 (n=1)	0.23 (n=1)	MSC
Mid-end	Clam	0.11 (n=1)	8.79 (n=2)	ASC
Mid-end	Salmon	0.12 (n=4)	0.24 (n=1)	ASC
Mid-end	Tiger prawn	0.20 (n=1)	0.18 (n=2)	ASC
Mid-end	White shrimp	0.25 (n=5)	0.13 (n=1)	BAP
Mid-end	Yesso scallop	0.27 (n=1)	0.22 (n=1)	MSC

Part II: face-to-face questionnaire survey

Full questionnaire (bilingual in Chinese and English)

關於消費者對可持續性海鮮的認識程度及偏好程度的問卷調查

Questionnaire survey on consumer awareness and preference for sustainable seafood

1. 年齡 Age

A. 18-24
B. 25-34
C. 35-44
D. 45-54
E. 55-64
F. 65-74
G. 75-84
H. 大於等於 85 歲 85 or above

2. 月收入 Monthly income

A. 少於 Less than 15000HKD
B. 15000HKD-20000HKD
C. 25000HKD-30000HKD
D. More than 30000HKD 以上

3. 學歷 Academic qualifications

A. 中學或以下 Secondary school or below
B. 高級文憑 / 副學士 Higher Diploma / Associate Degree
C. 學士 Bachelor
D. 碩士 Master
E. 博士或以上 Doctor or above

4. 性別 Gender

A. 男 Male
B. 女 Female

5. 職業 Occupation

A. 家庭主婦或主夫 Homemaker
B. 私人公司 Private Company
C. 公務員 Civil servant

D. 自雇人士 Self-employed
E. 老師 Teacher
F. 學生 Student
G. 環境與可持續發展方面專業人士
Professions in the field of environment and sustainable development
H. 無業者 Unemployed
I. 其他 Others_____

6. 您平均每 3 個月在超市購買海鮮的頻率
On average, how often do you purchase seafood from supermarkets within every 3 months?
A. 從不購買 Never
B. 很少購買（1-3 次）Rarely (1-3 times)
C. 有時候會購買（4-6 次）Sometimes (4-6 times)
D. 經常購買（7-9 次）Often (7-9 times)
E. 總是購買（大於等於 10 次）Always (10 times or above)

7. 您認為以下商標哪些是可持續海鮮認證標籤？
Which of the following trademarks do you consider to be sustainable seafood certification labels?

A. 

B. 

C. 

D. 

E. 

F. 

G. 都不認識 I don't even know them.

8. 您願意購買與普通海鮮相比差價多少的可持續性海鮮？
How much difference in price would you like to pay for sustainable seafood as compared to regular seafood?

A. -10%
B. -5%
C. 0%
D. 5%
E. 10%

9. 以下哪個選項最能準確描述可持續海產品？ (Cognition)
Which of the following options most accurately describes sustainable seafood?

A. 可持續捕撈，可追溯來源的野生海鮮
Wild seafood that can be sustainably caught and traced back to its source.
B. 以避免傷害環境的方式去捕捉或養殖的海鮮
Seafood caught or cultured in a way that avoids harming the environment
C. 符合負責任水產養殖規範的海鮮
Seafood that meets responsible aquaculture practices
D. 一種依從可持續發展策略而捕撈或養殖的海鮮
Harvested or cultured seafood in accordance with sustainable development strategy

10. 在以下詞語中選出你認為和可持續海鮮相關的詞語。 (Cognition)
Choose from the following descriptions that you think are relevant to sustainable seafood

A. 價格高的海產品 Highly priced seafood
B. 用環境友好型捕撈方式捕撈的海產品
Seafood harvested by environmentally friendly fishing methods.
C. 休漁期捕撈的海產品 Seafood caught during the fishing moratorium.
D. 所有人工養殖的海鮮 All seafood from aquaculture.
E. 捕撈獲得的瀕危物種 Endangered species caught from the wild.

11. 對可持續性海鮮的喜好程度？ (Attitude)
Level of preference for sustainable seafood？

A. 極度不喜歡 Extremely not preferring
B. 不喜歡 Not preferring
C. 正常 Normal
D. 喜歡 Preferring
E. 極度喜歡 Extremely preferring

12. 您會主動了解可持續性海鮮的信息嗎？ (Attitude)
Will you actively seek information on sustainable seafood?
A. 極度不願意 Extremely unwilling
B. 不願意 Unwilling
C. 中立態度 Neutral attitude
D. 願意 Willing
E. 非常願意 Very willing

13. 您願意向您的親戚朋友推薦食用可持續性海鮮？ (Attitude)
Would you recommend sustainable seafood to your friends and relatives?
A. 極度不願意 Extremely unwilling
B. 不願意 Unwilling
C. 中立態度 Neutral attitude
D. 願意 Willing
E. 非常願意 Very willing

14. 您平均每 3 個月在超市購買可持續性海鮮的頻率？ (Behaviour)
On average, how often do you purchase sustainable seafood from supermarkets within every 3 months?
A. 從不購買 Never
B. 很少購買（1-3 次）Rarely (1-3 times)
C. 有時候會購買（4-6 次）Sometimes (4-6 times)
D. 經常購買（7-9 次）Often (7-9 times)
E. 總是購買（10 次或以上）Always (10 times or above)

15. 您願意花時間尋找和購買可持續性海鮮嗎？ (Behaviour)
Are you willing to spend time to look for sustainable seafood?
A. 極度不願意 Extremely unwilling
B. 不願意 Unwilling
C. 中立態度 Neutral attitude
D. 願意 Willing
E. 非常願意 Very willing

16. 當您準備購買海鮮（包括可持續海鮮和普通海鮮）時，您會優先考慮購買可持續性海鮮嗎？ (Behaviour)

When you are purchasing seafood (both sustainable and regular), are you willing to prioritize sustainable seafood?

A. 極度不願意 Extremely unwilling
B. 不願意 Unwilling
C. 中立態度 Neutral attitude
D. 願意 Willing
E. 非常願意 Very willing

Part III: preliminary survey

Priority of local consumers in selecting seafood products in supermarkets

A preliminary, smaller scale survey was conducted between March and April 2023 before the study to investigate the priority of local consumers on their choice of seafood. The survey was done using a simple face-to-face questionnaire on haphazardly selected, adult consumers in local supermarkets. Respondents were asked to rank the following criteria when choosing seafood products:

1. Price
2. Freshness
3. Nutritional value
4. Food safety
5. Place of origin
6. Sustainability

N = 77 responses were collected from four supermarkets. 54.05% of the respondents selected freshness as their first priority, followed by price (26.09%), food safety (22.03%), place of origin (9.52%) and nutritional value (4.26%). None of the respondents selected sustainability as their first priority.