

Valuation of sea cucumber attributes through laddering¹

Timothy H. Lo

Purchasing dried sea cucumber and rehydrating it for cooking has always been a time consuming process. This study aims to provide direction for the development of more convenient products. Specifically, this research will:

- identify and rank the importance of quality attributes used by restaurants to judge the quality of dried sea cucumber; and
- produce a “hierarchical value map” linking sea cucumber attributes with consequences and values.

This research uses the laddering technique to identify important sea cucumber characteristics and to link them to consequences. Laddering uncovers product characteristics and consequences by following the means-end theory (Grunert 1995). Consequences are important; as Bredahl et al. (1998) found with respect to product design, it is necessary to translate consumer demands into product specifications that can be met by producers. With regard to sea cucumbers, however, it is especially complicated because the majority of restaurant owners’ perceptions of dried sea cucumber differ from the quality of cooked sea cucumber as perceived by consumers. Olsen and Reynolds (2001) mention that the key to the means-end approach is understanding consequences. Hence, this research focuses on how restaurants judge the quality of dried sea cucumber and the consequences of selecting sea cucumber, based on certain attributes. The study employed a sample of 10 chefs and 4 wholesalers/retailers in Singapore. Selected respondents were well acquainted with sea cucumber products, and were willing to talk about them. The information collected in the interviews was coded, and frequencies were analysed in an implication matrix. The hierarchical value map (Fig. 1) presents a summary of the most frequent attribute–consequence relationships.

Moisture content

Moisture content influences the shelf life of dried sea cucumber (Fig. 1). Moisture is gauged by judging how heavy a sea cucumber is relative to its size, feeling how hard the sea cucumber is, and smelling for “off” odours. The lighter the sample, the drier it is, although numerous factors affect sea cucumber weight. The presence of salt, sand, calcium powder,

as well as flesh thickness affect weight; therefore, experience is needed when using weight as an indicator of moisture. The harder the sea cucumber, the drier it is, but each species is unique with some being softer than others. A sea cucumber that is not dried properly will rot and give off bad odours. The majority of respondents suggested that the implications of moisture content are mainly economic. The implication matrix, however, shows that a minority of respondents linked moisture content with rehydration, cooking processes, and eating quality. This suggests that the moisture attribute may have both economic and eating quality implications.

Exterior appearance

It is important that dried sea cucumber not to be damaged as it causes disintegration during cooking (Fig. 1). This is particularly important for sea cucumber dishes served whole. For example, whole sea cucumber stuffed with meat would fall apart if there were cracks in the flesh. This affects the presentation of the dish, which consequently impacts on the reputation of the restaurant. Some respondents mentioned that for certain unspecified species, smooth skin is an important attribute as it indicates that the sea cucumber was still alive when it was caught. According to these respondents, skin texture influences the eating quality of the sea cucumber. However, what constitutes smooth or rough skin could not be confirmed as skin texture varies widely between species. Furthermore, only two respondents mentioned skin texture; therefore, it is not thought to be an important attribute. The term exterior appearance also describes a uniform round shape. Exterior appearance is one attribute that producers can focus on to enhance value without modifying the inherent characteristics of the sea cucumber. Producers who are aware of dishes requiring whole sea cucumber, can focus on exterior appearance when processing sea cucumber destined to be cooked whole. Subasinghe (1992) details sea cucumber processing to obtain acceptable exterior appearance.

Size

The size of the sea cucumber influences the type of dish and the cooking process (Fig. 1). Different

1. Summary of a document submitted for the Honours Degree in Bachelor of Agribusiness (Aquaculture) at Curtin University of Technology.

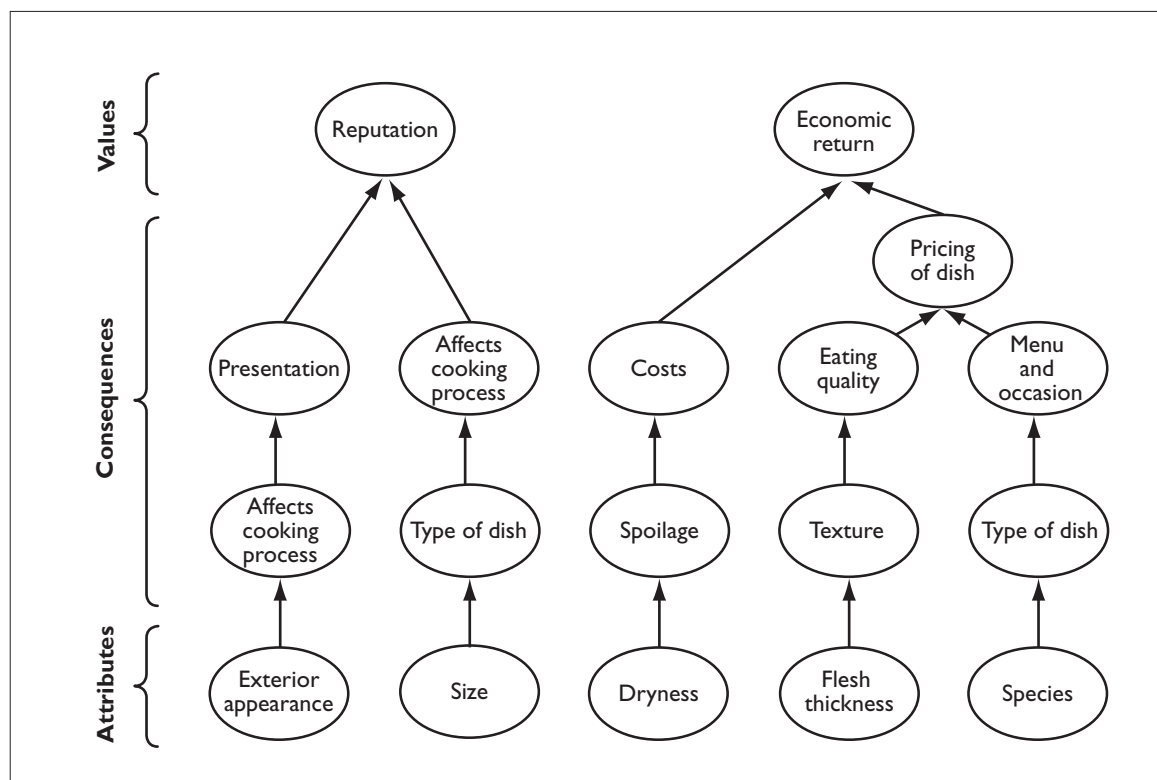


Figure 1. Hierarchical value map of sea cucumber attributes

dishes require different cooking times and unless the correct size of sea cucumber is selected, the sea cucumber may not be cooked to perfection. An overcooked sea cucumber becomes “mushy”, affecting the reputation of the restaurant. Chefs at Huat Kee’s Teochew restaurant and Quan Xiang Yuan Seafood restaurant mentioned they preferred to purchase a sack of ungraded sea cucumber at an inexpensive price instead of graded sea cucumber. This is because it is important for restaurants to have a range of sizes so that a variety of sea cucumber dishes can be prepared. Bigger sea cucumbers are worth more but they are also cooked differently: larger sea cucumber taking longer to cook. Larger sea cucumbers may be worth more because dishes that use larger sea cucumber are often served on special occasions (e.g. sea cucumber roasted with a whole duck served at weddings). When purchasing ungraded sea cucumber, size and exterior appearance varies, although the purchasing decision is determined by economic return. Lower priced cucumbers with poor exterior appearance are chopped up and used in dishes requiring sea cucumber pieces. Restaurants’ preference for ungraded sacks of sea cucumber is likely to continue; therefore, sea cucumber grading may be more suitable for retail markets or for processors that sell rehydrated sea cucumber.

Flesh thickness

Texture is the most important characteristic when judging sea cucumber, as the product itself has no flavour of its own. As a result, sea cucumber consumers focus on texture to gauge quality. Good texture is described as flesh that has some springiness without being tough or soft. Generally, thicker flesh results in better texture but each sea cucumber species has unique texture characteristics. The ultra premium species, Qi Sam (*Apostichopus japonicus*), is noted for a “crunchier” or firmer eating texture. Large sea cucumbers usually have thicker flesh, therefore flesh thickness is more important in smaller and medium sized sea cucumbers. Respondents use flesh thickness as an indicator of texture and eating quality. Eating quality influences the pricing of dishes and economic return.

Species

Different species are used for different dishes and different dishes are served on different occasions (Fig. 1). Prices are adjusted according to the dish thereby influencing economic return (Fig. 1). Cooking style is influenced by the cooking traditions of different Chinese regions, which are known for using specific species of sea cucumber.

Therefore, when marketing sea cucumber to restaurants, it is important to match the correct species to the restaurant's cooking style. It should be noted that each species of sea cucumber has its own attributes. Dried sea cucumber is classified by species and certain species are only found in specific countries. Therefore, country of origin is another indicator of quality and consistency. Consistency is important because chefs become accustomed to utilising sea cucumber in a certain manner to obtain particular eating qualities. The ability to purchase sea cucumber from the same region repeatedly is a reason why relationships between restaurants and suppliers are valued.

Discussion

Relationships between restaurants and suppliers are also important because the true quality of sea cucumber can only be judged after it has been rehydrated (i.e. after purchasing occurs). This suggests an element of trust between suppliers and restaurants. Sea cucumber producers who have strong relationships with suppliers may be able to provide restaurants with a more consistent supply of sea cucumber from the same region. Walter (2003) finds that close supplier relationships also result in faster development of new products at a lower cost. Building strong relationships with suppliers is therefore mutually beneficial for sea cucumber producers, suppliers and even customers. While this research focused on restaurants as users of sea cucumber, it is just one of four distinct segments of customers for sea cucumber producers. Restaurants, retailers, wholesalers and processors represent different sea cucumber market levels and Zucker and Anderson (1998) suggest that different market levels have different preferences. As mentioned, some restaurants prefer to purchase sacks of ungraded sea cucumber at a cheaper price. Therefore, in creating value for customers, it may be wise to differentiate between segments of customers. A trend toward the purchase of already rehydrated sea cucumber by restaurants became evident through the course of this study. This suggests that the processing sector that produces rehydrated sea cucumber may be increasing in importance. Da Dong Restaurant, Marriot Hotel and Sheraton Towers stated that processing sea cucumber is a time consuming and labour intensive task. Sorensen et al. (1996) found that convenience in buying, preparing and eating fish was perceived as important to consumers of seafood. Therefore, in the development of new products, sea cucumber producers could focus on creating value through convenience. Innovation in research and development is also an important factor for the future of traditional food industries (Jordanna 2000). Restaurant chefs mentioned that seafood products

such as lobster, abalone and fish maw have overtaken sea cucumber in popularity. If the sea cucumber industry fails to innovate, it could lose greater market share.

Sea cucumber is commonly coated in calcium powder to protect against insect infestation and moisture absorption. However, there is conflicting evidence on the preference of calcium coating. Hong Kong consumers prefer calcium coated sea cucumber (Ferdouse 1997), while Huat Kee's Teochew Restaurant claimed it was a tactic employed by producers to add weight. Furthermore, Chef Chan's Cantonese Cuisine explained that if calcium powder was not washed off properly, it could give a bitter taste to the food. Quantitative studies are needed to determine where the bias lies for this attribute, although packaging could also be used to protect sea cucumber from insect infestation and moisture absorption. Protective packaging may even enhance convenience as less labour would be involved in scrubbing the calcium off.

If market orientation is to improve company performance, it implies the continuous adaptation of the company's products to the market (Grunert et al. 1996). Therefore, most of this discussion has centred on the creation of value for sea cucumber customers through new products or closer relationships. The food industry however, evolves slowly and incrementally, rather than through sudden technological revolution (Grunert et al. 1996). This is probably true for the actual sea cucumber product itself but not necessarily true for the value-added product. For example, packaging that allows supermarkets to stack punnets of strawberries more efficiently, can create value without modifying the actual product. Therefore sea cucumber producers should focus on creating value for specific segments through the creation of convenience.

Additionally, this research did not focus on the pharmaceutical prospects for sea cucumber. Chen (2003) highlighted the trend toward sea cucumber extracts as nutritional supplements and functional foods. Product development in this area could occur more quickly as compared with the food industry. Therefore, pharmaceutical applications for sea cucumber should be a priority for future research.

References

- Bredahl L., Grunert K.G. and Fertin C. 1998. Relating consumer perceptions of pork quality to physical product characteristics. *Food Quality and Preference*, 9(4):273–281.
- Chen, J. 2003. Overview of sea cucumber farming and sea ranching practices in China. *SPC Beche-de-Mer Information Bulletin* 18:18–23.

- Ferdouse F. 1997. Beche-de-mer and sharkfin - markets and utilisation, INFOFISH International.
- Grunert K.G. 1995. Food quality: A means-end perspective. *Food Quality and Preference* 6(3):171–176.
- Grunert K.G., Baadsgaard A., Larsen H. A. and Madsen T. K. 1996. Market orientation in food and agriculture. Boston: Kluwer Academic Publishers.
- Jordanna J. 2000. Traditional foods: Challenges facing the European food industry. *Food Research International* 3–4(33):147–152.
- Olson C.J. and Reynolds J.T. 2001. The means-end approach to understanding consumer decision making. In: Olson C.J. and Reynolds J.T. (eds). *Understanding consumer decision making*. New Jersey: Lawrence Erlbaum Associates.
- Sorensen E., Grunert K. and Nielsen N. 1996. The impact of product experience, product involvement and verbal processing style on consumers' cognitive structures with regard to fresh fish. Working Paper 42, Aarhus School of Business, Aarhus.
- Subasinghe S. 1992. Shark fin, sea cucumber and jellyfish: A processor's guide. Infomfish, Malaysia.
- Walter A. 2003. Relationship-specific factors influencing supplier involvement in customer new product development. *Journal of Business Research* 56(9):721–733.
- Zucker A.D. and Anderson L.J. 1998. Implications of choice behaviour and preferences in niche markets. *Aquaculture Economics and Management* 2(2):61–70.

Natural spawning observations

Bohadschia marmorata

Observer:	Michael Rard, Ecomar, La Reunion University	Moon:	5 days after new moon
Location:	La Saline-les-Bains, Petit Trou d'Eau, Reunion Island, Indian Ocean. Observed in the back reef in 1 m depth.	Tide:	Low tide
Date:	24 April 2004, 17:00.	Note:	Two male individuals have been observed in the classical upright posture.

Bohadschia similis

Observer:	Aymeric Desurmont, SPC
Location:	Baie de Tembia, New Caledonia. On sandy-muddy bottom. 3-4 m depth.
Date:	20 December 2003, 17:00.
Moon:	3 days before new moon
Tide:	High tide
Note:	Other specimens of the same species nearby showed no sign of reproductive behaviour.

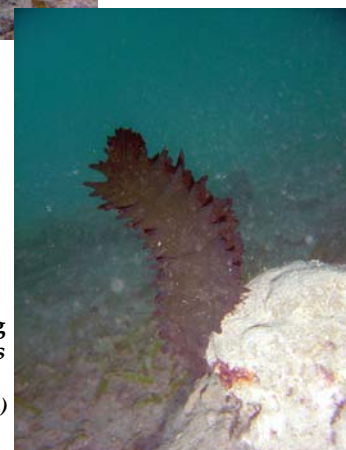


Spawning
Bohadschia similis

(Image: A. Desurmont)

Stichopus chloronotus

Observer:	Aymeric Desurmont, SPC
Location:	Baie des Citrons, New Caledonia. Bottom with rocky surfaces covered with crustose and sparse filamentous algae, and sparse <i>Cymodocea</i> seagrass areas. 3 m depth.
Date:	11 December 2003, 18:30.
Moon:	2 days after full moon
Tide:	2.5 h after low tide
Note:	Other specimens of the same species nearby showed no sign of reproductive behaviour.



Spawning
Stichopus chloronotus

(Image: A. Desurmont)