Enhancing the economic value and consumer preferences of commercial mondol stingray (*Himantura gerardi*) leather creative products

L Sahubawa\textsuperscript{1}, A Pertiwiningrum\textsuperscript{2} and Y Rahmadian\textsuperscript{2}

\textsuperscript{1} Departement of Fisheries, Faculty of Agriculture, Universitas Gadjah Mada, Jl. Flora, Bulaksumur, Yogyakarta, Indonesia
\textsuperscript{2} Faculty of Animal Sciences, Universitas Gadjah Mada, Jl. Fauna, Bulaksumur Yogyakarta, Indonesia

*Email: Latifahsahubawa2004@yahoo.com*

**Abstract.** The research objectives were to design, assess the economic value and consumer preference level of stingray leather products. The research method included a product design, analysis of economic value and consumer preferences. Mondol stingray (*Himantura gerardi*) leather, with a length of 50 cm and width of 30 cm, were processed into ID card wallet, man and women’s wallet and key holder. The number of respondents involved to analyze the preference level is 75 respondents (students, lecturers and employees of Universitas Gadjah Mada). Indicators of consumer preferences were model, color, price and purchasing power. The price of ID card wallet is Rp. 450,000; women wallet is Rp. 650,000 and a key holder is Rp. 300,000. Consumer preferences on ID card wallet were as follow: 84 % stated very interesting model; 83 % stated very interesting color; 61 % stated cheap and 53 % had enough. Consumer preferences of women’s wallet were as follow: 81 % stated very interesting model; 84 % stated very interesting color; 56 % stated cheap and 57 % had enough. Consumer preferences on key holder were as follow: 49 % stated interesting model; 72 % stated very interesting color; 61 % stated cheap and 57 % had enough.

**1. Introduction**

Ministry of Maritime Affairs and Fisheries, The Republic of Indonesia, has given an attention in the implementation of the concept of the blue economy by the utilization of fishery industries by-products/wastes into a variety of creative products with high economic potential [1]. Creative products are innovative products with high economic value that derived from the development of creativity, skills and innovation of individuals or groups, that potentially capable of generating creativity, intellectual property and employment [2]. One of an example of creative product derived from the fishery industry by-products is stingray leather. Stingrays are usually obtained as a by-catch product of catching operation using gill net, purse seine and hand poles. Nationwide, the production of stingrays until the end of 2014 reached 70,447 tons, including species of bird stingrays, shovel noses, **kekeh**, bats and flower/tiger [3]. Stingrays belong to economically important fish groups but are less favored by consumers because of its pungent meat (due to high ammonia content). In some areas that have considerable fisheries potential, they are often thrown back into the sea. Stingrays are generally sold fresh for ± Rp. 4,000–5,000 per kg [4, 5]. With the advancement of innovation as well as science, technology and art in the leather creative industry, stingray leather can be utilized for the development of commercial leather creative products and accessories with high economic value, meanwhile, its...
meat can be processed into commercial food products (jerky and steak) that are free from ammonia stench [6]. Tanned stingray leather (a type of mondol stingray) with a size of 8 inches and a price of Rp. 75,000/sheet can be processed into one ladies wallet (main product, 2-in-1 type) with the price of Rp. 350,000 and two pieces of bracelet/accessories (derived product) with the price of Rp. 300,000 [7]. This shows that one sheet of stingray tanned skin potentially gives the total economic value of Rp. 650,000 with the value added of 866%.

At the time of the catching season, the stingrays are landed in considerable quantities and are only sold fresh. Fresh stingray leather can be processed into tanned leather as raw material on the processing of leather creative product at a price ranged between Rp. 100,000–125,000 per sheet. The price range of mondol stingrays leather (per sheet) of small, medium and large size was Rp. 60,000–75,000; Rp. 75,000–100,000 and Rp. 100,000–125,000, respectively [8, 9], while other types of stingray leather, such as pariduri, have higher selling prices because of the pearls/beads along the center of the skin [7, 8].

The purposes of the research were to design, process and determine the level of consumer demand for commercial stingray creative products. This research provided information on processing technology as well as the economic value of stingray creative products to the community (especially coastal communities and small islands) as well as leather craftsmen and investors of fish-based goods and products.

2. Materials and Methods

2.1. Materials and equipment

The main raw materials used were stingray leather (mondol type) as well as supporting materials (cow leather, satin fabric, paperboard, glue, paint/dye and other materials). Stingray leather that was used has a length of 50 to 60 cm (size 8 inches) and the width of more than 30 cm, purchased from Kub Zazmi Leather, Moyudan, Sleman, Yogyakarta (figure 1). Important equipment used were a leather machine, grinding machine, dye machine, sewing machine, scissors and cutter.

2.2. The processing of stingray leather creative products

The processing of stingray leather creative products was performed by the following stages: design of product patterns; preparation and cutting of paperboard, stingray leather and satin cloth; skin coloration; forming of stingray sewing lines; stingray rays, cowhide and satin fabrics; gluing leather and fabric sheets; suturing; installation of accessories (buttons and rings); finishing (removal of dust and glue/glue remnants), shine and packaging. The processing of stingray creative products using pattern design method: cutting, coloring, gluing, sewing and finishing. The stingray creative products consisted of the main and derivative products. Main products were produced from the center part of the leather, while derivative products were made from the remaining leather from the main product processing. Main products were identity card wallet (2-in-1 type) or ladies/women wallet (2-in-1 type); while the derivative product was accessories (keyholders).
2.3. **Analyze of consumer preferences**

The consumer acceptances toward the stingray leather creative products were analyzed using consumer preferences/demand method [7]. The number of respondents used for the analysis of the level of consumer preference was 50 women and 25 men (total 75 people) representing three market segments (students, lecturers and employees) at Universitas Gadjah Mada, Yogyakarta. Consumer demand indicators consisted of: (1) product model (very interesting, interesting, interesting enough and not attractive); (2) color (very interesting, interesting, interesting enough and not interesting); (3) price (very expensive, expensive, cheap enough and very cheap) and (4) purchasing power (very high, high, low and very low).

3. **Results and Discussion**

3.1. **Types, specifications and prices of stingray creative products (main products)**

The types of stingray leather creative products chosen to be produced in this experiment were the products with the attractive shapes and colors as well as having high competitive selling points. There were two types of products, main product and derivative product. The main product was (1) 2-in-1 type identity card wallet (for passport and card) or (2) 2-in-1 type women's wallet, with specifications respectively as shown in figure 2 and figure 3. In addition to the main products, we also produced derivative products, accessories (key holder), which use raw materials from the remaining leather from the main product. Specifications of derivative products were shown in figure 4.

Identity card wallet (2-in-1 type) was one of the new products manufactured from the stingray leather. The similar product in the market had been made from cow leather. This type of wallet is used to facilitate the storage of medium to large personal identity cards, such as passport and credit card, which is often used in travel and banking transactions. The size of identity card wallet produced from stingray leather in this experiment was larger than the standard product. This product was not only designed to facilitate important personal documents but was also designed to add its functionality as a unique and exciting commercial accessories product. With the dimension of 17 cm × 11 cm × 2 cm, the identity card wallet was priced at Rp. 450,000 per specimen. The price of this product was more expensive than similar products made from another type of leather (Rp 250,000–300,000), but it offered attractive patterns and unique motifs, moreover, this kind of product was difficult to be found in outlets or commercial leather products store [7].

The women's wallet (grasp model, 2-in-1 type) was one of the newly engineered products of similar products made from stingray leather [10], but this new product has three interior parts and thicker than other women's wallet produced previously. This product was designed to facilitate the storage of medium to a large personal identity card, banknotes, bills, business cards and other securities. The design of this product was not only facilitating important personal documents but was also designed to add its functionality as a unique and exciting commercial accessories product. With
the dimension of 20 cm × 11 cm × 2.5 cm, the women’s wallet was priced at a range of Rp. 600,000–650,000 per specimen. The price of this product was more expensive than similar products from stingray leather (Rp. 350,000–400,000), but it offer and attractive looks, unique motifs and luxurious style, moreover, this product was still difficult to be found by the consumers (especially for the collectors of genuine leather products).

The key holders (type 2-in-1) were one of the newly engineered products of similar products made from the stingray leather [10]. This new product had a larger and more attractive size than similar products produced by other three manufacturers in Yogyakarta. This product was designed to facilitate the storage of small personal identity cards, such as Motor Vehicle Identity Letters and personal business cards. This product was not only aimed to facilitate the storage of identity document of motor vehicles (cars and motorcycles), but its functionality was also added as a commercial accessories product. With the dimension of 11 cm × 5 cm × 1.5 cm, the key holder was priced at Rp. 150,000 per specimen. The price of this product was higher than similar products (Rp. 125,000) that were sold by other producers in Yogyakarta, but this product offered an interesting and luxurious impression.

Figure 2. ID Card wallet (2-in-1 type, light green color) (specification: length 17 cm, width 11 cm, thickness 2 cm and price Rp. 450,000).

Figure 3. Women's wallet (2in-1 type, light green color) (specification: length 20 cm, width 11 cm, thickness 2.5 cm and price Rp. 650,000).
3.2. The level of consumer preference

3.2.1. ID card wallets (2-in-1 type). The level of consumer preference on the ID card wallet made from stingray leather was shown in table 1. Based on the results of consumer preference analysis of 75 respondents, it was known that the average of 84 % consumers stated that the model of identity card wallet was "very interesting" (highest on employees) and 16 % stated "interesting" (highest on lecturer). The consumer preference on color was 83 % stated "very interesting" (highest on the students) and 17 % stated "interesting" (highest on lecturers). The consumer preference on price was 39 % stated "expensive" (high on the employee) and 61 % stated "cheap enough" (highest on lecturers). The level of purchasing power was shown by 36 % of consumers was categorized as having "high purchasing power" (highest in lecturers), 53 % having "low/enough purchasing power" (highest on lecturers) and only 11 % having "very low purchasing power" (not affordable) with the highest score on employees.

Table 1. Level of consumer preference on ID card wallet as the stingray leather creative product.

| Consumer Demand Indicators | Level of Consumer Preference (Quality and Quantity) |
|----------------------------|--------------------------------------------------|
| Models                     | very interesting       | interesting   | interesting enough | not attractive |
|                            | 84 %                  | 16 %          | 0 %              | 0 %            |
| Color                      | very interesting       | interesting   | interesting enough | not interesting |
|                            | 83 %                  | 17 %          | 0 %              | 0 %            |
| Prices                     | very expensive         | expensive     | cheap enough     | very cheap     |
|                            | 0 %                   | 39 %          | 61 %             | 0 %            |
| Purchasing power           | very high              | high          | Low/enough       | very low       |
|                            | 0 %                   | 36 %          | 53 %             | 11 %           |

3.2.2. Woman’s wallet (2-in-1 type). The level of consumer preference on the women’s wallet made from stingray leather was shown in table 2. Based on the results of consumer preference analysis of 75 respondents, it was known that 81 % of consumers stated that the model of women’s wallet (2-in-1 type) was "very interesting" (highest on employees) and 19 % stated "interesting" (highest on students). The color preference analysis showed that 84 % of consumers stated the color of the product
was "very interesting" (highest on lecturers and students) and 16\% stated "interesting" (highest in students). The consumer preference on price was shown by 44\% of consumers stated "expensive" (highest on the employee) and 56\% stated "cheap enough" (highest on lecturer). For the consumer purchasing power, amount of 28\% consumers was categorized having "high purchasing power" (high on lecturers), 57\% having "low/enough purchasing power" (the highest in lecturers) and only 15\% having "very low purchasing power" (not affordable) with the highest score found on employees.

Table 2. Level of consumer preference on women’s wallet (2-in-1 type) as the stingray leather creative product.

| Consumer Demand Indicators | Level of Consumer Preference (Quality and Quantity) |
|----------------------------|-----------------------------------------------------|
| Models                     | very interesting | interesting | interesting enough | not attractive |
|                            | 81\%             | 19\%        | 0\%                | 0\%            |
| Color                      | very interesting | interesting | interesting enough | not interesting |
|                            | 84\%             | 16\%        | 0\%                | 0\%            |
| Prices                     | very expensive   | expensive   | cheap enough       | very cheap     |
|                            | 0\%              | 44\%        | 56\%               | 0\%            |
| Purchasing power           | very high        | high        | low/enough         | very low       |
|                            | 0\%              | 28\%        | 57\%               | 15\%           |

3.2.3. Accessories (key holders). The level of consumer preference on the key holders made from the stingray leather was shown in table 3. From the analysis of consumer preference, it was known that 48\% of consumers stated that the product/accessories model was "very interesting" (highest on the students); 49\% stated "interesting" (highest on lecturers) and only 3\% stated "interesting enough" (highest in students). The consumer preference on color was shown by 72\% of consumers stated that the color of the product was "very interesting" (highest on the student) and 28\% stated "interesting" (highest on lecturer). For the price, amount of 40\% consumers stated "expensive" (highest on the employee) and 60\% stated "cheap enough" (highest on lecturer). The purchasing power of 31\% consumers was categorized as having "high purchasing power" (highest on lecturers), 57\% having "low/enough purchasing power" (highest on lecturers) and only 12\% showing "very low purchasing power" (not affordable) with the highest value encountered on the employee.

Table 3. Level of consumer preference on key holders as the stingray leather creative product.

| Consumer Demand Indicators | Level of Consumer Preference (Quality and Quantity) |
|----------------------------|-----------------------------------------------------|
| Models                     | very interesting | interesting | interesting enough | not attractive |
|                            | 48\%             | 49\%        | 3\%                | 0\%            |
| Color                      | very interesting | interesting | interesting enough | not interesting |
|                            | 72\%             | 28\%        | 0\%                | 0\%            |
| Prices                     | very expensive   | expensive   | cheap enough       | very cheap     |
|                            | 0\%              | 40\%        | 60\%               | 0\%            |
| Purchasing power           | very high        | high        | Low/enough         | very low       |
|                            | 0\%              | 31\%        | 57\%               | 12\%           |

Based on the results of the above analysis, it was known that lecturers, employees and students have the same perception on the "model and color" of stingray leather creative products. The perception of lecturers on "price and purchasing power" was higher than employees and students. This is because lecturers have a steady income and higher than employees and students. When compared to employees (who had a steady income), it turned out that students had a higher desire to buy stingray creative products, even though they did not have a steady income. This is because the creative products are unique, attractive and luxurious, moreover, it can be used as accessories on the important
occasions so it would be needed by the women. Stingray creative products have a high economic value because they are interesting, unique and rarely found in the market, therefore they are able to be used as souvenir products or special gifts (birthdays and weddings) [7]. The uniqueness of stingray creative product is in its beads and pearls that spread on the surface of the leather and looks more attractive if given any color (black, brown, green, red, maroon, natural, pink and other colors) [11]. A stingray leather creative product with high selling prices was considered as a very special leather product and they were often purchased by local and state officials.

Overall, the level of demand and purchasing power of lecturers on stingray creative products was very high. This was due to the higher levels of income, education level, experience and desire compared to employees and students. Factors affecting consumers' purchasing power are the level of education, income, needs, habits and prices and goods model [12, 13]. In addition, geographical environmental factors, consumer behavior and product marketing strategies significantly influence the choice and purchase of new product types [14].

The higher the person's education level, the higher the need to be fulfilled. The higher consumer's income, the higher purchasing power and the various needs to be achieved. The level of demand for each consumer is varied, whereas consumers living in urban areas have higher purchasing power when compared to consumers living in rural areas. The lifestyle of people in the modern era shows a higher consumption rate of products/goods and services (consumerism). If the price of the products/goods or services increases, the consumer's purchasing power tends to decrease, otherwise if the price of the products/goods and services decreases, it is assured that consumer's purchasing power will increase. The new model of goods also will stimulate consumers to buy the goods in large enough quantities. Consumers are always striving for maximum satisfaction by meeting the various needs on desired products/goods and services [13]. This research indicates that consumers had a good acceptance of stingray leather creative products and general consumer preference was on their attractive model and color, as well as their affordable price.

4. Summary and Recommendation

4.1. Summary

Stingrays were utilized into creative leather products with high economic value, i.e. identity card wallet (a type of 2-in-1), women’s wallet (a type of 2-in-1) and key holders. Consumer preferences on identity card wallet were as follow: (1) model: 84 % stated very interesting and 16 % stated interesting; (2) color: 83 % stated very interesting and 17 % stated interesting; (3) price: 39 % stated expensive and 61 % stated cheap; and (4) purchasing power: 36 % was high, 53 % was enough/low and 11 % was very low. Consumer preferences on women’s wallet were as follow: (1) model: 81 % stated very interesting and 19 % stated interesting; (2) color: 84 % stated very interesting and 16 % stated interesting; (3) price: 44 % stated expensive and 56 % stated cheap; and (4) purchasing power: 28 % was high, 57 % was enough/low, and 15 % was very low. Consumer preferences on key holder were as follow: (1) model: 48 % stated very interesting, 49 % stated interesting and 3 % stated interesting enough; (2) color: 72 % stated very interesting and 28 % stated interesting; (3) price: 39 % stated expensive and 61 % stated cheap; and (4) purchasing power: 31 % was high, 57 % was enough/low, and 12 % was very low.

4.2. Recommendation

To increase the economic value of stingray creative products, it is necessary to create innovation and development of new products that are interesting or trendy. In addition, it is necessary to use the remaining leather from the main product processing for the production of other attractive commercial accessories with high economic value.
References

[1] Anonimous 2013 *Report from the Minister of Marine Affairs and Fisheries of Republic Indonesia at the Opening Ceremony of Quality Management Training of Marine and Fisheries Resources* (Jakarta)

[2] Ministry of Trade of The Republic of Indonesia 2009 *Development of the Blue Economy Concept in the Marine Affair and Fisheries Sector* Message from the Minister of Marine Affairs and Fisheries of Indonesia Republic (Jakarta: Opening Ceremony of Quality Management Training of Marine and Fisheries Resources)

[3] Anonimous 2015 *Data on Production Statistics and Volume of National Fisheries Production* (Jakarta: Directorate General of Capture Fisheries Ministry of Marine Affairs and Fisheries Republic of Indonesia)

[4] Sahubawa L 2008 *Yucer Grant for Community Service* (Yogyakarta: Universitas Gadjah Mada)

[5] Sahubawa L and Pertiwiningrum A 2010 *Community Service Handing Grant* (Yogyakarta: Universitas Gajdah Mada)

[6] Sahubawa L 2013 *Grant of Community Service* (Yogyakarta: Universitas Gadjah Mada)

[7] Sahubawa L and Pertiwiningrum A 2016 *Presentation Material of International Conference on Integrated Coastal Management and Marine Biotechnology (ICM-MBT)* in 29th - 30th November 2016 (Bogor: International IPB Conference Center (IICC))

[8] Sahubawa L 2011 *Proceedings of Leather, Rubber and Plastics R and D Workshop* ISBN: 878–979–8378–14–0 (Yogyakarta)

[9] Sahubawa L, Pertiwiningrum A and Pamungkas 2011 *Leather, Rubber and Plastics Magazine* ISSN: 1829–6971 (Yogyakarta)

[10] Sahubawa L Pertiwingrum A, Lelana I Y B and Meylinda 2010 *Proceedings of the VII Annual Seminar* (Yogyakarta: Departement of Fisheries Faculty of Agriculture Universitas Gadjah Mada)

[11] Sahubawa L 2017 *Material Presented* (Bogor: 3rd EMBRIO International Symposium)

[12] Anonimous 2017a [http://dokumen.tips/documents/beberapa-factor-what-is-using-the-power-buy-the-community.html](http://dokumen.tips/documents/beberapa-factor-what-is-using-the-power-buy-the-community.html) Accessed on 18th July 2017 at: 09.08 WIB

[13] Anonimous, 2017b [https://prezi.com/0scpap5st92y/daya-beli-konsumen/](https://prezi.com/0scpap5st92y/daya-beli-konsumen/) Accessed on 18th July 2017 at 09:20 WIB

[14] Anonimous, 2017c [http://dkey0303.blogspot.co.id/2012/03/makalah-consumer-behavior.html](http://dkey0303.blogspot.co.id/2012/03/makalah-consumer-behavior.html) Accessed on 18th July 2017 at 09:26 GMT