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Application of technology to increase economic value and consumer preferences of tilapia, stingray and cow leather products

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Abstract. Technological innovation in the business world can immediately increase the novelty, economic value, added value & market segment of commercial products. Preservation, tanning & processing technology can increase the novelty, economic value & market segment of commercial leather products. The objective of the research is to examine the impact of technological innovation on the economic value, added value & consumer preferences for fish leather products. This study uses market segmentation, value-added, consumer preferences and descriptive methods. The economic value of commercial fish skin products are as follows: (1) preservation technology produces economic value of fresh tilapia skin of IDR 3,000 per sheet, stingray skin of IDR 50,000 & cowhide of IDR 5,000; (2) tanning technology produces economic value for tilapia skin of IDR 7,500 per sheet, stingray skin of IDR 125,000 and cowhide of IDR 10,000; (3) the design and technology of processing a 3-in-1 tilapia skin wallet produces an economic value of IDR 300,000; 3-in-1 stingray skin wallet for IDR 400,000 & 3-in-1 cowhide wallet for IDR 240,000. The added value of the 3-in-1 tilapia skin wallets is IDR 441,000; stingray leather wallet which is IDR 650,000 & 3-in-1 cowhide wallet is IDR 235,000. The average value of consumer preferences for commercial tilapia, stingray & cow leather wallets are 85%, 90% & 75%. The highest consumer preferences are based on the attributes of color, shape and price.

1. Introduction

The Ministry of Maritime Affairs and Fisheries of the Republic of Indonesia integrates the concept of the blue economy in national development planning as one of the strategies for optimal, sustainable and environmentally friendly utilization of fishery resources; increasing fishery production; export volume and added value of fishery products [1]. The development of the blue economy concept in the Marine and Fisheries Sector is based on three important aspects, namely (1) regional development, (2) utilization of industrial-scale fisheries resources and (3) increasing added value and zero wastes. The development of the 3 blue economy concepts is expected to be able to increase the growth of the fishing industry (upstream and downstream industry), the adoptions of large numbers of workers, economic growth, foreign exchange, non-tax state income (PNBP) and foreign exchange. [2] said that the economic potential of Indonesia's fishery resources reached 510 billion US\$ per year, which came from the Capture Fisheries Industry (20.0 billion US\$), Aquaculture (210 billion US\$), Fishery Product Processing (100 billion US\$). US\$), (4) Marine Biotechnology (180 billion US\$).



Based on data from the [3], in the last 9 years (2010 to 2019) national fishery production has increased significantly reaching 33% per year, with the realization in 2010 of 5,384,418 tons and in 2019 of 23,146,148 tons. Non-Tax State Revenue (PNBP) from the Marine & Fisheries Sector in 2013 was IDR 229 trillion and in 2018 it reached IDR 375 trillion. Fishery production is predicted to increase in line with the development of technological innovations in the field of capture fisheries and aquaculture as well as in the field of processing (downstream) as the basis for increasing value-added industries.

Innovation based on 4 frameworks of thought (new ideas, valuable, original, & easily accepted by consumers). In an era that is all-technology with an increasingly modern & dynamic life, strategic steps are needed through innovation by utilizing technological sophistication in an effort to increase added value, performance and productivity [4]. One of them is in the commercial leather products business, where its development requires fresh innovation and technology involvement, starting from the upstream industry to the downstream industry. Several technological innovations developed to increase the added value of fish skin products are preservation, tanning, design and processing of leather products, packaging & marketing network models [5].

Production of types of fish that produce raw materials for the leather product processing industry (stingray, snapper, lencam, kaci-kaci, tilapia, carp & the like) until 2017 reached 2,289,692 tons [3]. The yield of fish skin produced from the fish filet processing industry is $\pm 20\%$, so that the total raw material for fish skin produced reaches 457,938 tons [6]. Fish skins (stingrays & scaly skins) are classified as "exotic skins" (beads, pearls, scales) so that they can be processed into very attractive commercial leather products with high economic value, guaranteed production, quantity, quality and continuity of fish skin raw materials.

According to [5], [7], the use of fish skins produced from the filet processing industry is still limited to traditional methods because people do not understand value-added-based technological innovations. The leather waste produced is only used as raw material for processing rambak/crackers ($\pm 50\%$) at a very cheap price, duck/duck animal feed ($\pm 40\%$) and a small portion for processing commercial leather products (10%) [8]. Advances in science and technology in the leather industry as well as the increasing number of leather goods and leather products, making fish skins can be processed into a variety of commercial leather products/goods and accessories that have high economic value, up to 2 - 3 times the price of commercial cowhide products and the like [8],[9].

The advantages of stingray skin are that it has beads and pearls as well as tilapia and snapper skin which have scales on the surface and are classified as "exotic skins" because they can be processed into commercial leather products/goods that are very attractive, luxurious, original & liked by consumers. with its advantages that exceed conventional leather products [10],[11]. Said by [9], technological innovation is needed in stages from upstream to downstream industries (preservation, tanning, processing, packaging) to obtain the best quality of raw materials and commercial leather products/goods. This study aims to examine the effect of technological innovation on increasing added value and consumer preferences for creative goods and products for tilapia, stingray and cow skins.

2. Materials and Methods

2.1. Equipment and Materials

The equipment used in the tanning process and processing creative products from lencam fish skin are as follows: tanning drum, set knife, digital scale, pH paper, plastic measuring cup, cutting board, thermometer, plastic bucket, embossing/glazing machine, vibration staking machine, leather sestet machine, hot stamp embossing machine, sandpaper, scissor board, scissors, ruler and others. The materials used in the tanning process are lencam fish skin, water, preventol ZL, peramit MLN, $\text{Ca}(\text{OH})_2$, NaOH, $(\text{NH}_4)_2\text{SO}_4$, HCOOH, feliderm Bat AB, salt, H_2SO_4 , glutaraldehyde, NaCOOH, NaHCO_3 , baking soda, acrylic resin, melamine resin, dispersing agent, mimosa, sulphited oil, synthetic oil, emulsifier, green dyestuff (green AMBS), red dyestuff (dermapel red PBR), chocolate dyestuff (melioderm Havana R), lanolin, resin cationic, antifungal, surfactant (MD), ammonia, SB 100, aqualen Top LN, meliorop 239, wex top, and EW. The materials used for the processing of wallets and

bracelets are cardboard, glue, keychains, cowhide, vuring cloth, tanned fish skin, zippers, sewing thread, glue, “Sakura” pletter, button magnets and other materials.

2.2. Research Methods

2.2.1. Fish skin sample preparation. The main raw material (black tilapia fish skin) is obtained from the Fish Filet Processing industry (PT. Kurnia Mitra Makmur) Purwakarta, West Java. Black tilapia fish skin preparation is carried out at the Wet Laboratory, Department of Fisheries, Gadjah Mada University Yogyakarta. The process of tanning fish skin and analysis of skin quality at the Leather Quality Testing Engineering Laboratory, Center for Leather, Rubber and Plastics (BBKKP) Yogyakarta. Tanned raw material (stingray skin) for commercial leather product processing, ordered at UMK Tanning & Commercial Fish Skin Product Processing (Zazmi Leather, Jl. Klodran, Sumberagung Moyudan Sleman DIY). Commercial tilapia and stingray skin products are processed in the UKM of Commercial Fish Skin Product Craftsmen (Zazmi Leather, Jl. Klodran, Sumberagung Moyudan Sleman DIY and Fanri Collection, Jl. Kaliurang Km. 13.2 Ngaglik Sleman DIY).

Analysis of added value & consumer preferences is carried out at the Department of Fisheries UGM, Department of Fisheries and Maritime Affairs DIY, Department of Industry and Trade DIY, and PT Andrawina DMM, Sleman DIY. The research flow diagram can be seen in Figure 1, 2, 3. The main stage in the black tilapia fish skin tanning process is preparation (thawing of fish skin samples that are still frozen, washing with water and removing the remaining meat under the surface of the skin), then followed by the leather tanning process using a mixture of formalin 4% and mimosa 5%.

2.2.2. Preparation and preservation of raw materials (fish skin).

	1	Fresh fish skin imported from the fish filet processing industry in a cold state (with cold preservatives: bulk ice), washed thoroughly with running water (first washing), removed the remains of meat under the skin surface, washed again (second washing) with running water to remove the remains of meat and mucus.
	2	Fish skins are soaked in a salt solution (NaCl, 5%) for 30 minutes in order to provide a preservative effect on fresh skin. Furthermore, the skin is removed and drained for 30 minutes to remove the remnants of the fresh fish skin.
	3	The leather is packed with polyethylene (PE) plastic, put in styrofoam and stored frozen in a freezer, pending the time of use to make tanned leather as a raw material for commercial leather products.

Figure 1. Preparation and preservation of raw materials (fish skin).

2.2.3. Tanning processing (*pre tanning, tanning, finishing*) of fish skin.



1

The pre-tanning stage (beam house process) consists of 6 processing treatments, namely: washing and sorting, liming, removing meat and scales, removing lime, scraping protein, removing fat. The pre-tanning stage aims to get fresh skin that is ready to be tanned.



2

The tanning process consists of 5 processing treatments, namely: tanning, acidification, re-tanning, re-tanning and neutralization. Tanning process aims to convert raw (fresh) leather into finished leather (ready to use).

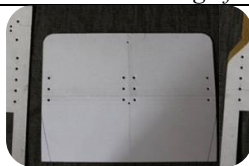


3

The finishing stage consists of 9 processing treatments, namely: base painting, oiling, fixation, stretching, stretching, leveling, glossing, lacking and trimming. The finishing stage aims to prepare finished leather to be processed into commercial leather goods and products (wallets, bags, shoes, belts, key chains, jackets, bracelets and others).

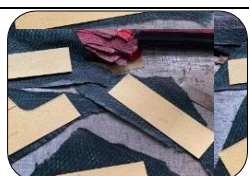
Figure 2. Stages of the fish skin tanning process (*pre tanning, tanning, finishing*).

2.2.4. Processing of commercial leather products (*purses and bracelets*).



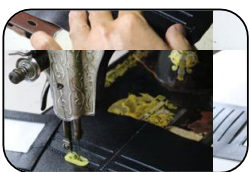
1

Product pattern design. This stage aims to produce an image of a leather specimen pattern that will be used to prepare/select raw materials (leather/plastic/furring fabric) that are suitable for product processing.



2

Selection & cutting of raw materials (leather/plastic/furring fabric). This stage aims to cut and prepare raw materials according to the pattern (interior and exterior) of the product.



3

Gluing and sewing. This stage aims to combine and sew interior and exterior parts and accessories to form a finished product.



3

Embossing, finishing, packaging & storage. This stage aims to give a name/logo/brand on the surface of the product skin, followed by cleaning of dust, remaining threads and glue and stored in the packaging.

Commercial fish leather product:

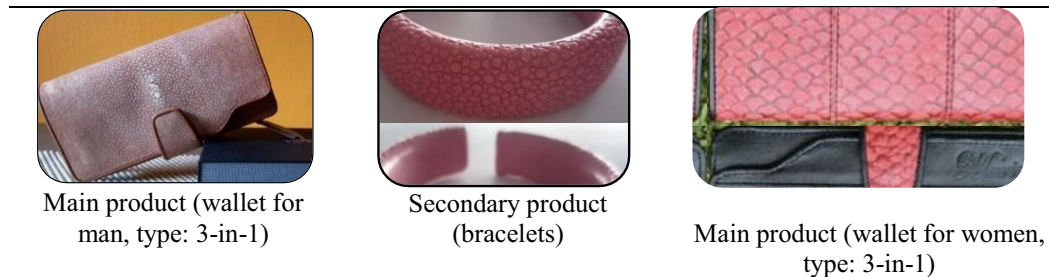


Figure 3. Processing of commercial leather products (purses and bracelets).

2.2.5. Analysis of the added value of commercial leather products. The added value of the product is the added value of the product's sale at each processing stage (market segment), starting from fresh lencam fish skin (raw material), tanned skin (semi-finished material), to the final product (main and derivative product). According to [5], added value is the difference between the selling price of the final product and the price of semi-finished materials and/or raw materials that have a market segment. The added value of the product is expressed in the form of rupiah and/or percentage, with the following calculation formula.

$$\text{Value added (\%)} = \frac{(\text{Final Product Price} - \text{Initial Product Price})}{\text{Initial Product Price}} \times 100\%$$

2.2.6. Analysis of consumer preference for commercial leather products.

Consumer preferences are determined using the Conjoin method with the help of IBM SPSS software. Following are the steps in conjoint analysis.

2.2.6.1. Determination of product attributes and sub attributes. The determination of product attributes and sub-attributes is done by multiplying the number of sub-attributes for each attribute. This study uses 3 attributes, each of which has 3 sub-attributes. The price attribute has 4 levels (IDR. 300,000; 350,000; 400,000 & 450,000) for black tilapia leather wallet & IDR. 350,000; 400,000; 450,000 & 500,000 for stingray skin wallet (mondol type); the color attribute has 3 levels (green, brown and red color) and the model attribute has 2 levels (the 2-in-1 model wallet and the 3-in-1 model), so the number of stimuli generated is 24 stimuli. The number of stimuli is quite large and makes it difficult for the respondent to give a ranking or score. The reduction in the number of stimuli is done by means of a fractional factorial design with the help of IBM SPSS software [12].

2.2.6.2. Determination of respondents. Determination of respondents in this study using purposive sampling method, meaning that the selection of respondents based on the criteria that have been determined by the researcher with the number of respondents (sample) as many as 126 people. The types of respondents used in the analysis of consumer preferences. Recapitulation of the results of the conjoint analysis is the utility value of each attribute level, the importance value (relative importance) and the accuracy of the prediction. The highest utility shows the component of the attribute that is most preferred by the respondent. The results of the relative importance value with the highest weight indicate attributes that are important in influencing the choice of respondents, while the accuracy of predictions by looking at the Person's R and Kendall's Tau values, where the significance value will show the closeness of the relationship between attributes and sub-attributes (levels) if the significance value is below 5% [13].

3. Result and Discussion

3.1. The Role of Technological Innovation in Increasing the Economic Value of Leather Products

In today's technological era, human life is increasingly modern and dynamic because it uses technological innovation in every activity to increase productivity and quality of life (added value) [4]. In an effort to increase the added value (quality, product novelty, economic value and consumer

demand) of commercial fish skin products, it is absolutely necessary to innovate and involve technology. Said by [8], there are 4 (four) steps of technological innovation to increase the added value of commercial fish skin products, namely: skin preservation technology, leather tanning, product diversification and development, packaging accompanied by trendy models/shapes to attract consumers' attention.

The economic value of black tilapia fish skin, stingray skin & increases along with the increase in the level of processing technology (preservation technology/1st level of technology, tanning technology/2nd level of technology and Product Design & Processing/3rd level of technology) as shown in Table 1. In the production process to produce 1 (one) piece of black tilapia wallet (type 3-in-1), the preservation technology produces an economic value of IDR 9,000, tanning technology (IDR 22,500) and design & processing technology (IDR 450,000) with a total economic value of IDR 481,500 (see Table 1 & Figure 4a).

The economic value of each technological innovation segment (preservation, tanning and design and processing) to produce 1 stingray skin wallet (3-in-1) is as follows: IDR 50,000; IDR 125,000 & 700,000 with a total economic value of IDR 875,000, while to produce 1 cowhide wallet, each technological innovation segment produces the following economic values: IDR 5,000; IDR 10,000 & 240,000 with a total economic value of IDR 255,000. Of the three technological innovations developed, it turns out that the economic value of a stingray skin wallet is greater (IDR 875,000) compared to a tilapia leather wallet (IDR 481,500) and a cow leather wallet (IDR 255,000). This is because the characteristics of stingray skin are very strong and have beads and pearls on the surface (exotic skin) and can be processed into very attractive commercial leather products with a higher selling value than black tilapia skin products (scaly fish skin) and cowhide (conventional leather).

The economic value (selling value) of the lencam fish skin wallet (3-in-1 type, handle model & variations) which was analyzed using panelists/respondents (employees) from the Department of Marine Affairs and Fisheries, Gadjah Mada University Yogyakarta; Center of Leather, Rubber & Plastic Yogyakarta; Leather Technology Academy and Students from the Fisheries Department and the Leather Technology Academy Yogyakarta is IDR 350,000 with product specifications (length: 20 cm, width: 10 cm & thickness: 3.0 cm) [8]. The selling value of the mondol stingray leather wallet (3-in-1) is IDR 400,000 and the thorn stingray leather wallet is IDR 750,000 with specifications (length: 22 cm, width: 12 cm & thickness: 3.5 cm) [14]. [5] designed a women's wallet (handle model, type 3-in-1) made from mondol stingray skin with an economic value of IDR 650,000 and a consumer demand level of 85%. On the other hand, [11], also designed women's & men's wallets (handle model, type 2-in-1) made from Mondol par fish skin with a selling value of IDR 650,000 and a consumer demand level of 87% as well as men's wallets (handle model, type 3-in-1) made of stingray leather with a selling price of IDR 1,250,000 & an acceptance rate of 90%.

Table 1. Economic value & added value of black tilapia & stingray skin in each processing technology segment*

No	Economic Value of Processing Technology Segment (IDR)			Added Value	Product Specification
	Preservation Technology (1)	Tanning Technology (2)	Product Design & Processing (3)		
A Black Tilapia Leather Wallet					
1	Wallet type 2-in-1: fresh skin, 3 pieces @ 3,000 = 9,000 length = ±30 cm & width = ±15 cm	3 sheets @ 7,500 = 22,500	Wallet (1 piece) = 250,000 Bracelet (3 pieces) @ 50,000 = 150,000 Amount 400,000	(3) - (1) = 400,000 - 9,000 = 391,000	length: 18 cm width: 8 cm thick: 2 cm model: handle
2	Wallet type 3-in-1: fresh skin, 3 pieces @ 3,000 = 9,000 length = ±30 cm & width = ±15 cm	3 sheets @ 7,500 = 22,500	Wallet (1 piece) = 300,000 Bracelet (3 pieces) @ 50,000 = 150,000 Amount 450,000	(3) - (1) = 450,000 - 9,000 = 441,000	length: 20 cm width: 10 cm thick: 3 cm model: handle
B Stingray Leather Wallet (mondol type)					
1	Wallet type 2-in-1 fresh skin, 1 piece @ 50,000 = 50,000 length = ±35 cm & width = ±20 cm	1 sheet @ 125,000 = 125,000	Wallet (1 pieces) = 300,000 Bracelet (2 pieces) @ 150,000 = 300,000 Amount 600,000	(3) - (1) = 600,000 - 50,000 = 550,000	length: 18 cm width: 8 cm thick: 2 cm model: handle
2	Wallet type 3-in-1 fresh skin, 1 piece @ 50,000 = 50,000 length = ±35 cm & width = ±20 cm	1 sheet @ 125,000 = 125,000	Wallet (1 pieces) = 400,000 Bracelet (2 pieces) @ 150,000 = 300,000 Amount 700,000	(3) - (1) = 700,000 - 50,000 = 650,000	length: 20 cm width: 10 cm thick: 3 cm model: handle
C Cow-hide					
1	Wallet type 2-in-1 fresh skin, 1 piece @ 5,000 = 5,000 length = 30 cm & width = 30 cm	1 sheet @ 10,000 = 10,000	Wallet (1 pieces) = 150,000 Bracelet (4 pieces) @ 10,000 = 40,000 Amount 190,000	(3) - (1) = 190,000 - 5,000 = 185,000	length: 18 cm width: 8 cm thick: 2 cm model: handle
2	Wallet type 3-in-1 fresh skin, 1 piece @ 5,000 = 5,000 length = 30 cm & width = 30 cm	1 sheet @ 10,000 = 10,000	Wallet (1 pieces) = 200,000 Bracelet (4 pieces) @ 10,000 = 40,000 Amount 240,000	(3) - (1) = 240,000 - 5,000 = 235,000	length: 20 cm width: 10 cm thick: 3 cm model: handle
Note *: the number of skins for the production of 1 wallet, type 3-in-1					

According to [5], fish skin raw materials (stingray skin and scaly fish skin) have higher advantages compared to conventional leather (cow, buffalo, sheep and similar skins) because they have beads and pearls as well as scale marks that make fish skin products more attractive, attractive and liked by consumers. According to [15], [11], stingray skin and scaly fish skin are classified as "exotic skins" because they can be processed into very attractive commercial products with a higher selling value than cowhide and similar products. Further said by [16], the development of leather product innovations (especially the model/shape, type and interior & exterior equipped with product packaging), ensured added value & greater profits. Innovation has various functions for the development of a business, namely (1) increasing business growth and profitability, (2) shaping the character of a product/business to compete competitively & be accepted in the market, (3) running a relevant business with great added value. Innovation and technology must be applied together, where innovation will provide added value to a company/product and technology will support the acceleration of every work process in order to get maximum results [17].

3.2. The Role of Technological Innovation in Increasing the Added Value of Leather Products

Based on Table 1 and Figures 4a, b, c, it can be seen that the processing of tilapia leather wallets for women (handle model, 3-in-1) has a total economic value of IDR 450,000 with an added value of IDR 441,900 (4,900%). The processing of stingray leather wallets for women & men (handle model, 3-in-1) has a total economic value of IDR 700,000 with an added value of IDR 650,000 (1,300%), while the processing of cowhide leather wallets (handle model, type 3-in-1) has a total economic value of IDR 240,000 with an added value of IDR 235,000 (4,700%). Of the three types of products with added value, it can be seen that the processing of commercial tilapia leather wallets with their derivative products has the largest added value, followed by cowhide wallets and stingray skin wallets. The amount of added value of a commercial fish skin product is largely determined by the price of raw materials, product design and innovation as well as the type and number of derivative products produced.

The added value of processing women's wallets (handle model, 3-in-1) from mondol stingray skin reached 2,000% and men's wallets (handle model, 3-in-1) by 1.875%. The selling price of a Mondol stingray leather wallet (3-in-1) is IDR 400,000 and a stingray leather wallet IDR 750,000 with specifications (length: 22 cm, width: 12 cm & thickness: 3.5 cm) [14]. [5] designed a women's wallet (handle model, type 3-in-1) made of Mondol stingray skin with an economic value of IDR 650,000 and a consumer demand level of 85%. On the other hand, [11] also designed women's & men's wallets (handle model, type 2-in-1) made of Mondol par fish skin with a selling value of IDR 650,000 and a consumer demand rate of 87%. and a men's wallet (handle model, 3-in-1) made of stingray skin with a selling price of Rp. 1,250,000 & an acceptance rate of 90%.

The total economic value reached IDR 1,450,000 with added value IDR 1,400,000 can be produced from 2 sheets of stingray skin. The total economic value reached IDR 2,500,000 with added value IDR 2,400,000 [11]. [5] the total economic value of processing Mondol stingray leather wallets (for men & women) is IDR 980,000 with an added value of IDR 940,000 (1,860%). According to [9], processing of women's/men's leather wallets (2-in-1 & 3-in-1) and their derivative products (key chains & pearl bracelets) (3-in-1 and 2-in type W/P wallets -1) and derivative products (key chains and pearl/beaded bracelets) used for value added analysis. The added value of mondol stingray skin is IDR 920,000 (1,250%) and thorn stingray skin is IDR 955,000 (816,7%).

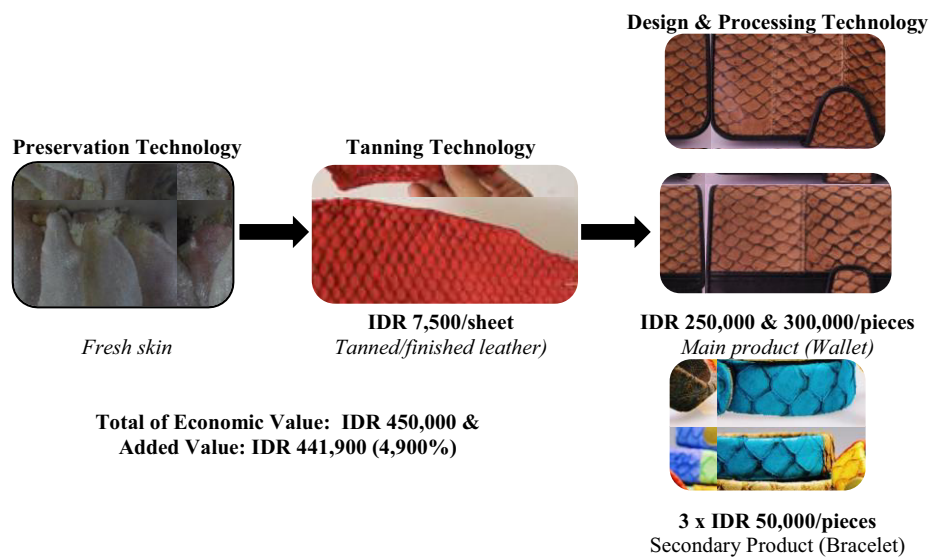


Figure 4a. Production technology innovation & increasing the economic value of black tilapia skin.

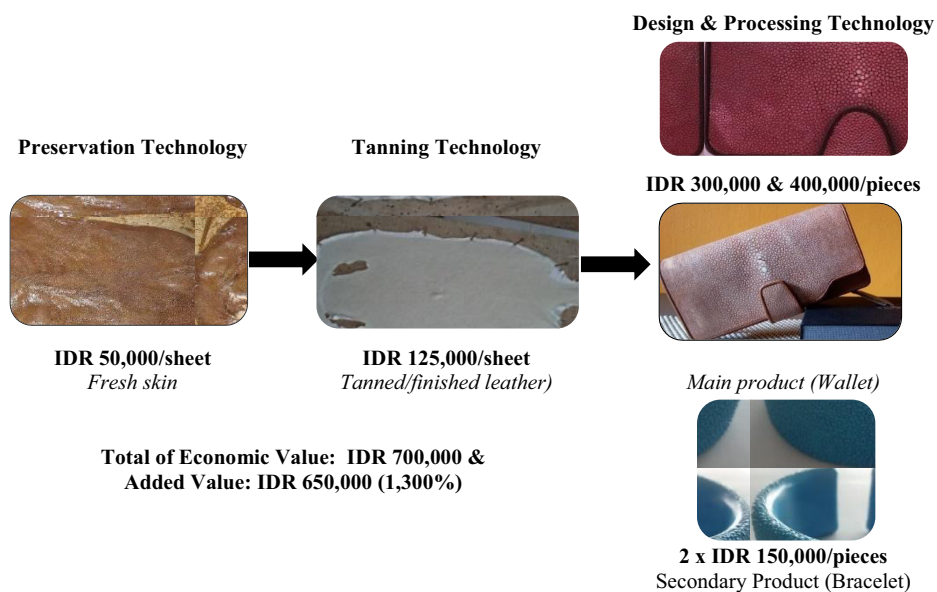


Figure 4b. Production technology innovation & increasing the economic value of strigay skin.

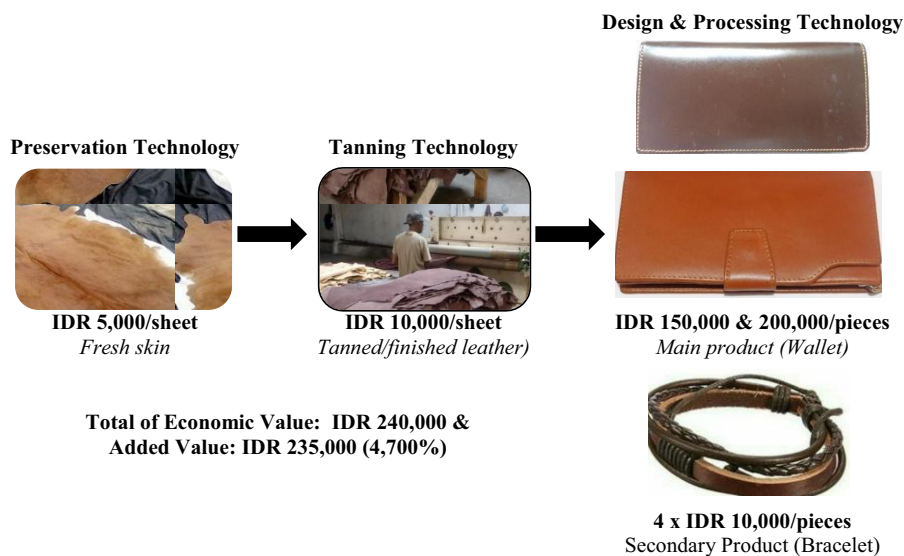


Figure 4c. Production technology innovation & increasing the economic value of cow skin.

According to the [18], added value is a professional and sustainable management (management) of goods/services so that they have high selling value. Increasing the added value of goods/services can be done through various ways or approaches, including creating special programs for loyal customers, improving service quality, promoting product functions to the fullest, improving packaging, provide extra services, reward loyal customers, increase product selling prices, provide a guarantee system, build brand awareness, take advantage of positive consumer testimonials, choose professional employees in managing the business, developing product innovations & conducting business training.

3.3. Consumer Preference

Based on the results of the analysis, the average value of consumer preferences on wallets made of black tilapia, stingray and cowhide skins are 85%, 90% and 75%, respectively. The added value and consumer preferences of stingray leather wallets are higher than tilapia leather and cowhide products. The highest consumer preferences are based on the attributes of color, shape and product price. Consumers prefer stingray leather wallets because they are based on several considerations, including (a) the surface of the leather fish skin wallet has beads and pearls that other products do not have, so it is classified as very unique, (b), the shape and color choices of the wallet are different. very attractive, (c) relatively affordable prices although slightly more expensive than tilapia leather wallets and cow leather wallets.

According to [5], 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 (type, 2-in-1) 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. The consumer preferences for mondol stingray leather product were (1) models (85% of respondents expressed a very interesting & 15% of interesting); (2) colour (90% of respondents expressed a very interesting ad 10% of interesting); (3) quality (very good is 85% & 15% of good); (4) price (20% of stated they were quite expensive, 42% of considering it very expensive & 38% said reasonably priced); (5) purchasing power (26% said affordable, 62% said reasonably priced & 12% of unreachable) [11].

Consumer preferences are important in marketing because they are closely related to the success industry to achieve its goals, namely purchasing decisions made by consumers on the basis of consumer preferences [19]. [20] said that consumer preference is a choice of likes or dislikes by someone towards the products (goods and services) that are consumed. Consumer preferences show the preferences of various existing product choices that can be used to analyze the level of satisfaction for consumers.

4. Conclusion

The economic value of commercial fish skin products are as follows: (1) preservation technology produces economic value of fresh tilapia skin of IDR 3,000 per sheet, stingray skin of IDR 50,000 & cowhide of IDR 5,000; (2) tanning technology produces economic value for tilapia skin of IDR 7,500 per sheet, stingray skin of IDR 125,000 and cowhide of IDR 10,000; (3) the design and technology of processing a 3-in-1 tilapia skin wallet produces an economic value of IDR 300,000; 3-in-1 stingray skin wallet for IDR 400,000 & 3-in-1 cowhide wallet for IDR 240,000. The added value of the 3-in-1 tilapia skin wallets is IDR 441,000; stingray leather wallet which is IDR 650,000 & 3-in-1 cowhide wallet is IDR 235,000. The average value of consumer preferences for tilapia, pari & commercial cow leather wallets are 85%, 90% & 75%. The highest consumer preferences are based on the attributes of color, shape and price.

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