

# LEATHER WASTE INTO VALUE ADDED LEATHER PRODUCTS: A WASTE TO WEALTH APPROACH

**Md. Amjad Hossain and Syed All Zami**

Institute of Leather Engineering and Technology, University of Dhaka.

**Abstract:** *Production of finished leather and leather goods create various types of cutting wastage, solid wastes, and effluents which lead to immense environmental and atmospheric pollution along with biological chain destruction. To keep pace with the rapid development of the up to date leather industry, various innovative techniques have been developed and these should be cost-effective and eco-friendly. This study aims to identify the methods to utilize the waste generated from the leather products industries as raw material and convert into value added leather products. Seven small market-demand leather products like Headphone Holder, Decorative Skull, Key Rings, Earring-set, Doggy Belt, Bottle Holder, Bracelets were made from leather cutting wastages. The pattern making and cost calculation was evaluated in a systemic way. Small leather goods need to be acceptable in the national or international marketplace. To survive in the marketplace, the designers or manufacturers especially who manufacture small leather goods from leather wastage should know the costing method and also need to know its acceptance by releasing prototype samples of their goods in the marketplace. The whole study is going to give a new business idea to the young entrepreneur as well as it will work as a solution for reducing leather wastage and save the environment.*

**Keywords:** *Cutting wastage, Recycling, Cost-effective, Leather goods.*

## Introduction

Manufacturing is one of the vital sectors in any society, irrespective of being a high or low-income economy (Fisher et al., 2018). Leather products are one of the most traded products globally. The leather products trade is presently exceeding the US \$80 billion per year and which is anticipated to grow as there is an increase in population and urbanization of the countries (Sivaram & Barik, 2019). In Asia, leather footwear is the fastest-growing segment of the leather industry of China, Bangladesh, India, and Vietnam. Bangladesh meets the demand for about 10% of the world's total leather market (Akter & Al-Mahfuz, 2019) but China is the no.1 largest leather producing country in the world with over 6.2 billion square-feet of leather produced every year and representing more than 25% of the annual global leather production (GLIF, 2020). In terms of Bangladesh, Leather and allied leather industries are the leading manufacturing industries based on availability of raw material, geographical environment, and manpower and is favorable for the development of leather and leather products industry (Swarna & Mia, 2018).

Leather has become an integral part of our lives we use from bag to the shoes. We wear almost each and everything that we use can be replaced with leather. So, the leather goods industry every day providing different leather products such as bags, ladies' purses, wallets, shoes, belts, etc. but the industry providing also a huge amount of leather wastage during production, and mostly the Cutting department is responsible for it. Leather is the raw material in the cutting department for producing products which is also very expensive where too much wastage can damage an industry's future. Generally, out of 1000 kg of rawhide, nearly 850 kg of solid wastes are produced from leather industries, and only 150 kg of the raw material is converted into leather products (Zafar, 2020; Yorgancioglu et al., 2020). With traditional cutting, only

50–60% of the material is actually used as products and by digital cutting solutions companies can use up to 10% more of it. The largest quantity of waste is generated at the cutting step during production in the industry. The cutting rate for leather's range 25-60% (Ruiz, 2020). Some of the wastage generated due to poor grain of leather which is not applicable for quality products. Some of them are obtained from the interlocked space. Some of them from the allowance wastage from production etc. Cutting damages in the middle of the hides/skin can make leather impossible to use for larger leather products such as sofas. Holes, notches, and cuts make a skin useless for manufacturing leather. Suitable knives and well-trained staff can ensure a good leather yield (LCW, 2021). Therefore, valorization of these industries leather cutting wastages several methods and processes is vital for the perspective of eco-benignity and with respect to converting into new value-added products (Yorgancioglu et al., 2020). The industry can utilize the wastage by making small leather goods depending on the demand of customers. Small leather goods manufacturers have to come forward to utilize the large amount of leather wastage produced in leather goods industries. In this paper we reporting an approach to reduce the amount of leather wastage by manufacturing some market-demand Leather goods from the leather wastage which lead to make a profitable business idea. The small and medium categories entrepreneurs can easily collect these types of waste materials from the leather products industry and start a business by making small products.

## Materials and Methods

### Cutting Wastage Collection

The wastages were collected from Accenture Footwear and Leather Products Limited, Munsipara, Hemayetpur, Savar, Dhaka, industry as shown in Figure-1 and sort out based on cow, goat, or calfskin, etc. Based on the color and texture of leather wastage another sorts out also done to provide a great appearance and a classy outlook to the consumers as leather goods or products. Range of color and design widen the selection range, which encourage the prospective users to wear these products to use in a multitude of ways, be it fashionable or functional. Based on this thinking, the cutting wastages were another sorting based on color and jewelry fashion fact (Mamun et al., 2019).



Figure 1. Leather Wastages

### Reinforcement Materials

**Pattern paper:** Pattern is the 2D form of 3D object. Basically, pattern is the primary formational design which actually show the measurements, size, design or shapes of the product to the designer. Pattern can be use as pattern paper or as plastic material sheet.

**Lining:** Lining is basically textile cloth which is use to cover-up the flesh side of the leather & to provide comfort during wear or use.

**Adhesive:** Adhesive is the chemical base? Rubber base solution which is use to provide a better adhesion between the pieces of leather or between leather with other reinforcement.

**Thread:** Thread is the material which is use to provide permanent bond into folding area or between the joining portion of the two pieces.

**Rivet:** Rivet is the material use to join into punched area of leather components with the help of hammer, it has 2 parts.

**Screw Rivet:** Screw Rivet is the updated form of rivet. Used to join leather components. But anyone can open or close two components by rotating the screw of it.

**Square Ring:** Square ring is a metallic material which is generally use to make a loop.

**Keyring:** Keyring is a circle shape metallic material use to hold keys.

**Button:** Button is the material use to join two components. For that, anyone can easily open or close the join.

### Supporting Tools

**NT-cutter/Knife:** Generally, for pattern cutting or leather cutting, this hand tool is used.

**Scissor:** Scissor is use to cut lining material, foam, leather or excess thread of the product.

**Hammer:** Hammer is generally used to hammering on folding or joining area & also sometime to attaching rivets or buttons on the leather products.

**Hole-Puncher:** Hole-puncher are different by their diameter's measurement. Generally this tool is use to make hole on leather.

### Sequential Operation of Different Parts of Headphone Holder

We visualized and prepared a design of a headphone holder. According to our design, we prepared the pattern and then measured the area of selected wastage and also cut the leather by knife according to the pattern from the selected wastage. After cutting, we measured the area of all leather components of it. Then we attached two pieces of leather using adhesive and stitch. After that, we punched on the leather with the help of puncher and hammer and also cut the punched area as a small slit to make an opening. Finally, the headphone holder had been completed.

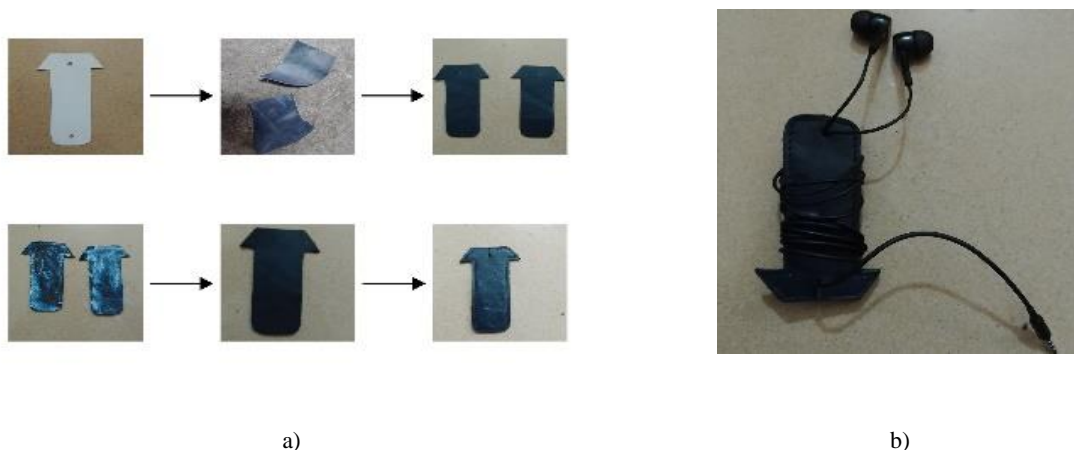


Figure 2. Headphone holder (a) Manufacturing Process (b) Final view.

### Sequential Operation of Different Parts of Decorative Skull

We visualized and prepared a design of a decorative skull. According to the design, we prepared the pattern and then measured the area of selected wastage and also cut the leather by knife according to the pattern from the selected wastage. After cutting, we measured the area

of all leather components of it. Then we punched on the leather with the help of puncher and hammer and then provide a hand-stitch into all punches area to make a 3D formation.

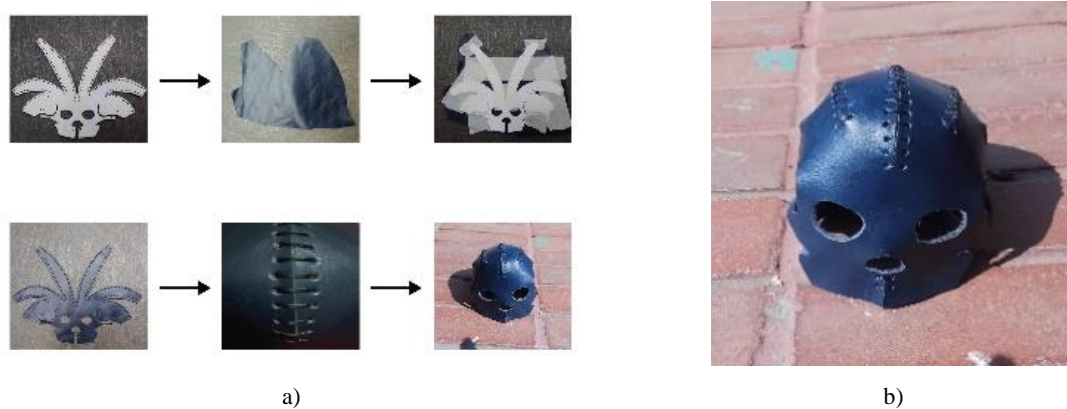


Figure 3. Decorative Skull (a) Manufacturing Process (b) Final view.

### Sequential Operation of Different Parts of Leather Keyrings

We visualized and prepared two designs for leather keyrings. According to the designs, we prepared the patterns and then measured the area of selected wastage and also cut the leather by knife according to the pattern from the selected wastage. After cutting, we measured the area of all leather components for each key rings separately. Then for the first one, we attached two pieces of leather by using adhesive and stitch. After that, we punched on it with the help of puncher and hammer and attached a round ring & a keyring with it. On the other hand, for the second one, we attached two pieces of leather and foams using adhesive and folded the leather's edge just up on the foams. After that, we attached the loop in the middle of two foams by applying adhesive and stitch. Finally, we attached a round-ring and also a key-ring with it.

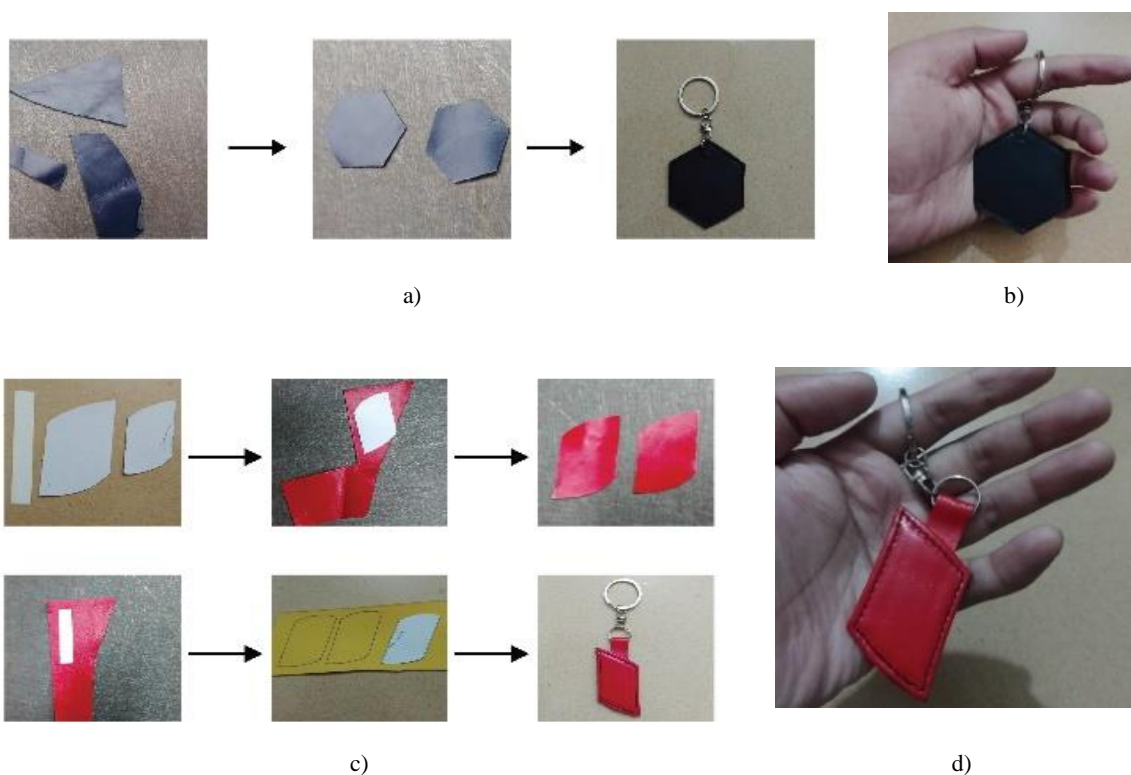


Figure 4. Leather Keyrings (a) Manufacturing Process of keyring-1 (b) Final view of keyring-1 (c) Manufacturing Process of keyring-2 (b) Final view of keyring-2

### Sequential Operation of Different Parts of Leather Earring-set

We visualized and prepared a design for a leather earring-set. According to our design, we prepared the pattern and then measured the area of the selected wastage and also cut the leather by knife according to the pattern from the selected wastage. After cutting, we measured the area of all leather components of it. Then we attached the pieces of leather using adhesive, punched on each with the help of a puncher and hammer. After that, we attached a round ring & an earring with each.

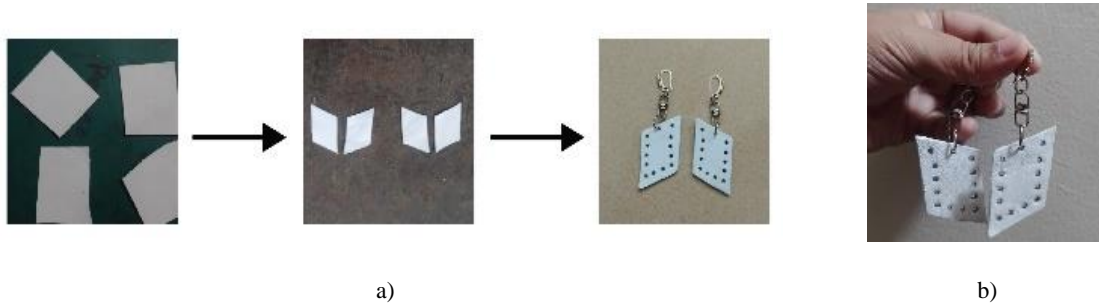


Figure 5. Leather Earring-set (a) Manufacturing Process (b) Final view.

### Sequential Operation of Different Parts of Doggy Belt

We visualized and prepared a design for a doggy belt. According to our design, we prepared the patterns and then measured the area of selected wastage and also cut the leather by knife according to the patterns from the selected wastage. After cutting, we measured the area of all leather components of it. Then we punched on leather with the help of hammer and puncher. After punching, we attached square rings to the punched area, and joined them by attaching rivets. Then we made the belt, attached the belt with the front design by attaching rivets, and also attached two buttons on the belt.

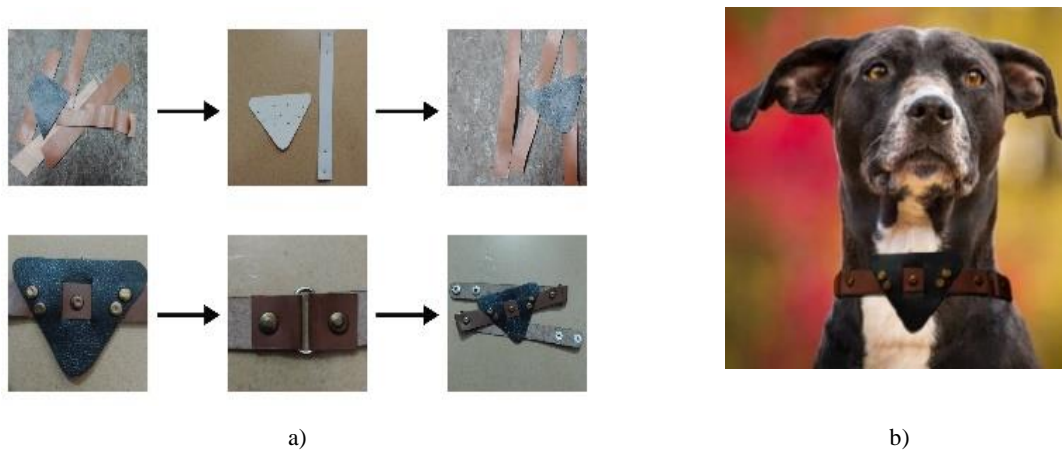


Figure 6. Doggy Belt (a) Manufacturing Process (b) Final view.

### Sequential Operation of Different Parts of Bottle Holder

We visualized and prepared a design for a bottle holder. According to the design, we prepared the patterns and then measured the area of selected wastage and also cut the leather by knife according to the patterns from the selected wastage. After cutting, we measured the area of all leather components of it. Then we punched on leather with the help of hammer and puncher, attached screw rivets to joined the cutting pieces. Finally, we attached a button to make the adjustable loop.

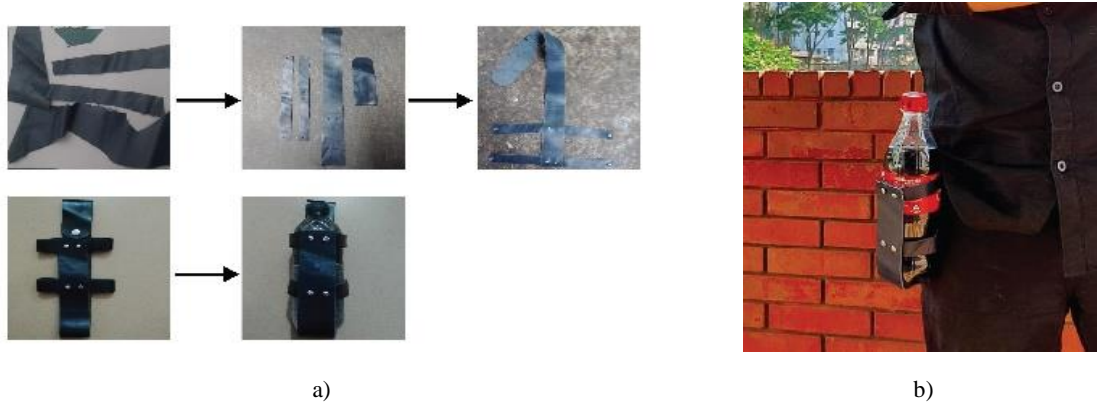


Figure 7. Bottle Holder (a) Manufacturing Process (b) Final view.

### Sequential Operation of Different Parts of Leather Bracelets

We visualized and prepared two designs for leather bracelets. According to our designs, we prepared the patterns and then measured the area of selected wastage and also cut the leather by knife according to the pattern from the selected wastage. After cutting, we measured the area of all leather components for each bracelets saperately. Then for the first one, we punched with the help of a hammer and a puncher on leather, made decorations with the thin leather portions, and attached the excess part by applying adhesive. Finally, we attached some rivets to it for decoration and a button for joining. On the other hand, for the other one, we punched on the leather with the help of puncher and hammer, attached square-ring and screw-rivets for the formation of chain. Finally, we attached a button with the help of puncher and hammer for joining.

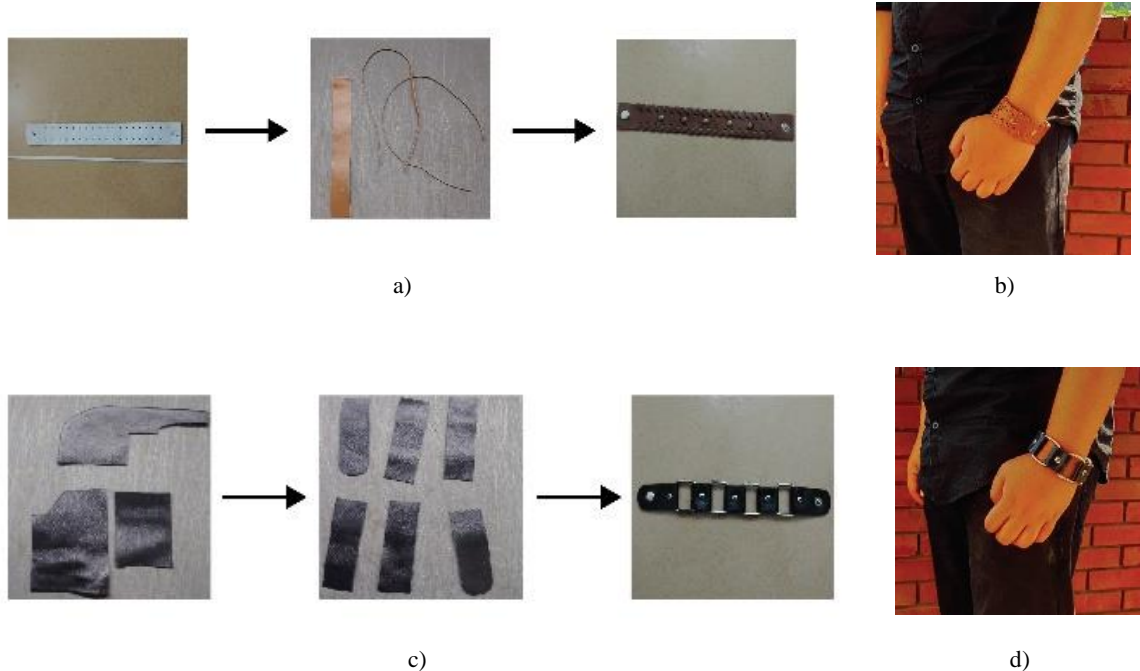


Figure 8. Leather Bracelets (a) Manufacturing Process of leather bracelet-1 (b) Final view of leather bracelet-1 (c) Manufacturing Process of leather bracelet-2 (d) Final view of leather bracelet-2

### Results and Discussions

In proper designing, methods & technical skills play significant role. Applying simple procedure seven small leather goods were made from cutting leather wastages. Other market-

demand leather goods like jewelry items also can be prepared from approach that stated in this paper.

The highest portion of leather wastage in leather and leather goods industries comes from the cutting room. Not all workers are always aware of maintaining cutting rules. If the cutting rules are followed properly, a large amount of leather can be saved from being wasted. Various types of small goods are possible to manufacture from wastage leather. Manufacturing goods from wastage leather can be a profitable business. Small industries can run easily using leather wastage and also can reduce the disparity in using leather goods among the general. Manufacturing goods from wastage leather can create the scope for self-employment. In here, the previous wastage versus the amount of wastage after making this type of small leather goods are compared.

Table 1. Area of selected wastage vs the area of wastage after making of small leather goods

<b>Serial No.</b>	<b>Name of the product</b>	<b>Area of Selected wastage (square-foot)</b>	<b>leather wastage used in product (square-foot)</b>	<b>Wastage amount after making product (square-foot)</b>
01	Headphone Holder	0.068	0.054	0.014
02	Decorative Skull	0.512	0.483	0.029
03	Leather Keyring-1	0.108	0.082	0.026
04	Leather Keyring-2	0.083	0.065	0.018
05	Leather Earring-set	0.092	0.071	0.021
06	Doggy Belt	0.221	0.192	0.069
07	Bottle Holder	0.441	0.326	0.115
08	Leather Bracelet-1	0.167	0.122	0.045
09	Leather Bracelet-2	0.138	0.109	0.029
Total=		1.870	1.504	0.366

The selected total leather wastage area was = 1.870 square feet. And on the average wastage percentage from leather products industry, it is counted as 15 % wastage during the production of bag, wallet, belt, purse, etc.

On the other hand, here we used a total of 1.504 square-feet from 1.870 square feet of wastage leather to manufacture the small leather goods.

If, 1.870 square feet of leather wastage is 15% wastage

Then, 1.504 square-feet leather wastage is =  $(15 \times 1.504) / 1.870$   
= 12.06%

So, the wastage reduces after making of small leather goods = 12.06%

And, wastage left now =  $(15 - 12.06) \% = 2.94\%$

Generally, it could be an effective area to reduce the amount of leather wastage by making small leather goods from the leather wastage and also the goods can be used in your daily life. Although all cutting wastages cannot be fully utilized in manufacturing purposes but this approach can be reduced by nearly 12% cutting wastages which be considered as one of the eco-friendly approaches in terms of environmental remediation.

In the recent days it's a great opportunity for young generation to start a new business but they need to know the acceptance of the product in the national or international market place. For that, every product should have a value & that value comes from the costing method. So before starting a business/launching a product with a large amount in the market place the costing

system should be maintained with the acceptance of the product. The costing method of Headphone Holder (1st product) is given below as an example –

Table 2. The costing method of headphone holder (1st product)

Serial No.	Material name	Quantity	Unit price (BDT)	Cost (BDT)
01	Leather	0.054 sqft	10	00.54
02	Thread	0.3 m	0.5	00.15
03	Adhesive (1pot = 2700g)	5g	800	01.48
Total material cost =				02.17 (~02.00)
Labour Cost (60 BDT/Hr)				08.00
=				
20% overhead cost =				00.43
Total Production Cost =				12.60
70% Profit =				08.82
5% Vat =				00.63
Market price =				22.08 (20 to 25 BDT)

The total material cost calculation was done using systemic approach. After that, we included the Labor Cost as well as Overhead Cost (additional cost in production) to get the total production cost. With Total Production Cost, a percentage of profit and a percentage of the vat were included to calculate the Market price of a product. In a similar manner costing calculation for rest of the manufactured products were done and the total material cost and market price for each good are given below-

Table 3. Material cost and market price of small leather goods

Serial No.	Name of the product	Total material cost (BDT)	Market Price (BDT)
01	Headphone Holder	02.00	20.00 – 25.00
02	Decorative Skull	06.00	40.00 – 45.00
03	Leather Keyring-1	06.00	25.00 – 30.00
04	Leather Keyring-2	05.00	20.00 – 25.00
05	Leather Earring-set	06.00	20.00 – 25.00
06	Doggy Belt	07.00	25.00 – 30.00
07	Bottle Holder	08.00	45.00 – 50.00
08	Leather Bracelet-1	06.00	30.00 – 35.00
09	Leather Bracelet-2	09.00	45.00 – 50.00

## Conclusion

The industry can utilize the wastage by making small market-demand leather goods. Small leather goods manufacturers have to come forward to utilize the large amount of leather wastage produced in leather goods industries. By making quality leather products from wastage leather produced during goods production we will earn more profit. Special facilities should be given to the entrepreneurs who want to set up new production and necessary steps should be taken to reduce wastage of leather and also to utilize the wastage leather. Self-employment can be achieved from using the proper use of leather wastage to making new goods. In this way the wastage of leather will minimum and the environment will also be eco-

friendly. Further research required to development new technology on utilization of leather wastages as value-added materials for other industries like food and agriculture.

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