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Recycling of Textile Waste into Usable Textile Products

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ABSTRACT

Aim of the Study: This study is important as it reducing wastage of old clothes by recycling them properly. The aim of this study is to utilize waste fabrics in a very useful way through recycling. The new products that formed are Jacket made with old jeans as patch work, footwear made with old cotton and handbag made with old velvet through recycling.

Methodology: This study was evaluated by respondents' point of view that was the students of LCWU of different departments through questionnaire.

Findings: It shows that it increases understanding of how waste textile materials can become more sustainable by recycling.

Conclusion: This study conclude that it boosts up creativity level while recycling textile waste into new textile material and also people spend less on new clothing by recycling textile waste.

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Introduction

Reusing and reusing materials, strands and waste materials is a compelling technique to assemble supportability in the attire business. A report by U.S. Ecological Security Organization expresses that materials are a significant wellspring of ozone harming substance discharges. To diminish the ozone harming substance emanations, endeavors are made to increment material reusing. In the ongoing situation, reusing apparel would have an impact comparable to eliminating 1,000,000 vehicles off the street consistently. The exploration is important for IFM's emphasis on planning materials and cycles for a round economy (Lee, 2017).

Turks' approach to reusing utilized garments was explored through the information acquired from the buyers by means of Facebook interpersonal interaction site. It was closed from the investigation of the information got that the buyers kept on utilizing their old garments and recently bought garments together; and that when they reused their pre-owned garments, they normally utilized a few techniques, for example, changing the model of the garments, fitting them to the relatives and giving them to people who could utilize the garments, however they didn't involve the garments for material trade, throwing out, consuming, selling or different purposes like cover, pad, and so on (Ozbek, 2018).

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A unique focal point of this survey lies on the arising field of biochemical fiber reusing processes, which could turn into a significant stage en route to a roundabout economy in the material handling chain. Inferable from the high selectivity of bio-impetuses, catalysts, these cycles could be utilized to eliminate a particular fiber material from multi-part materials. As the intricacy of materials is decreased, the recyclability is expanded (Bartl, 2019).

This paper surveys investigations of the ecological effect of material reuse and reusing, to give a rundown of the flow information and point out regions for additional examination. 41 investigations were surveyed, whereof 85% arrangement with reusing and 41% with reuse (27% cover both reuse and reusing). Fiber reusing is the most concentrated on reusing type (57%), trailed by polymer/oligomer reusing (37%), monomer reusing (29%), and texture reusing (14%). Cotton (76%) and polyester (63%) are the most concentrated on materials (Sandin, 2018).

Around 85% of all materials discarded in the US - about 13 million tons in 2017 - are either unloaded into landfill or copied. The typical American has been assessed to discard around 37kg of garments consistently. Furthermore, worldwide, an expected 92 million tone of materials squander is made every year and the comparable to a junk truck brimming with garments winds up on landfill destinations consistently. By 2030, it is normal all in all to dispose of in excess of 134 million tone of materials a year (Beall, 2020).

Material and dress reusing, is a possibly valuable action from ecological, social and financial perspectives, rather than landfilling or being utilized for energy. As urban communities progressively redirect other high-volume squander streams, for example, organics, the reusing of old garments has been known as the following wilderness for urban areas hoping to lessen strong waste (Rick, 2020). Most pieces of clothing that are reused are down-cycled into modern cleaning fabrics, protection material and sleeping cushion stuffing. The polyester in garments marked as being produced using reused materials generally begin from reused bottles. Just with a compound methodology could we at any point get the unrefined components back and close the circle on material reusing (Leblanc, 2020).

The present study is designed to recycle old waste fabrics like jeans is used to make jacket to make jacket as new garment. For jacket patch work is used in recycling. Old waste velvet and cotton fabric is used to make handbag and footwear.

Statement of Problem

The study is designed to recycle old clothes like old jeans is used to make jacket, old velvet is used to make new handbag and old cotton is used to make footwear. Rather than discarding old clothes utilized attire, it is reused. New clothing is tending, to get rid of older item.

Significance of the Study

Textile waste products are assembled from various sources and are then arranged and prepared relying upon their condition, structure, and resale esteem. Textile recycling is the cycle by which old attire and different materials are recuperated for reuse or material recuperation. The significance of reusing textile waste is progressively being perceived.

This study is important as it reducing wastage of old clothes by recycling them properly. By recycling, the new material will have its own uniqueness which will attract everybody. It will also reduce budget and the expenses of buying new clothes can be utilized in many other ways. Because of recycling, people spend less on new clothing by recycling old clothes or any other textile waste. It will boost up creativity level while recycling textile waste into new textile material. Recycling prevents waste of potentially useful materials. It can make a new trend in society and it also encourage consumers to recycle their textile materials and use it for longer.

This study is also important for household women who have low budget. Because of their low income, household women easily recycle their old clothes into new garment or any new textile product. Brands

can also do recycling by their old cloths with the stock that left.

Objectives of the Study

1) To find waste fabrics and recycle them into a new textile material.

2) To convert old jeans pent fabric into jacket.

3) To convert old cotton fabric into footwear.

4) To convert old cotton, buckram and velvet fabric into hand bag.

5) To analyze the new textile materials by questionnaire. (Pictorial analysis)

Methodology

The study employed experimental work by recycling old fabrics to produce new usable textile products. In this study, old fabrics like jeans, velvet and cotton were recycled to make different textile products which includes jacket, footwear and hand bag. Methodology of recycled jacket, handbag and footwear from old waste fabrics which include jeans, velvet and cotton are given below:

Jacket

In this study, new jacket was the finalized garment from the collected waste fabric that is jeans in 3 different colors that figure shows.

Figure 1: *4.5 x 4.5 inches dark blue jeans*	Figure 2*: of 4.5 x 4.5 inches sky-blue jeans*	Figure 3: *Square 4.5 x 4.5 inches grey jeans*
		

Now make a front and back pattern for new jacket with the help of pencil on chart paper as in figure 4 and 5.

Figure 4 front pattern	*Figure 5* back pattern
	

Take the measurements of body for jacket. After taking measurements, cut the waste jeans fabric of size 4.5 x 4.5 inches into patch form regarding to body measurements that can be seen in figure 6. Figure 7 also shows all patches of same size. As the selected old fabric, set the patches according to the body measurements very carefully as 7 shows.

Figure 6 grey, dark blue & sky-blue jeans	*Figure 7* Set the pieces to check a final look	*Figure 8* Stitched new fabric
		

After setting the patches, have a look on these once again. Then stitch the jacket with sewing machine. But before start stitching, do basting for joining patches with needle and thread. So, it may not be difficult to stitch those patches from directly with machine. After basting, stitch those patches with machine and then it became a single fabric that can also be seen in figure 8.

Now that recycled new fabric from old textile fabric is ready to cut for new garment. Place the pattern that is made in the starting steps on the new recycled fabric. Then cut it according to the pattern to make jacket of perfect body measurements as figure 9 & 10 shows.

Figure 9 Front jacket patterns	*Figure 10 Back jacket patterns*
	

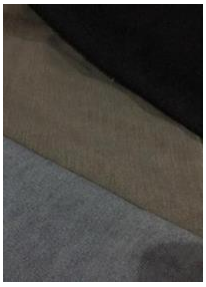
Before stitching, overlock all the joining patches from inner side. Now sew it with machine as in figure 11. At last, sew the lace with machine on border of jacket that can be seen in figure 12.

Figure 11 Stitched jacket	*Figure 12* Sew lace to enhance jacket	*Figure 13* Ready to wear
		

Stitch the beats that shows in figure 13 with thread and needle by hand for enhancing the beauty of jacket. Hence, the recycled jacket from old jeans is ready to wear as a new garment also shows in figure 13.

Sample

Sample for making jacket is old waste jeans fabric that is in 3 different colors dark blue, light blue and grey as shows in figure 14, lace in figure 15 and beats can be seen in figure 16.

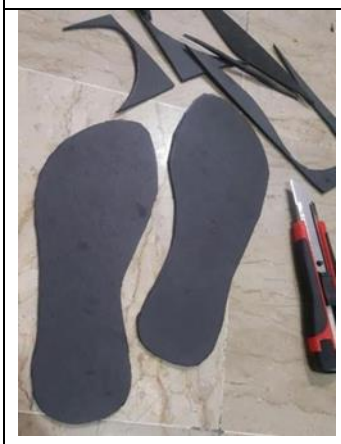
Figure 14 Grey, dark blue & sky-blue old jeans.	*Figure 15* Lace to enhance jacket	*Figure 16* Beats to enhance jacket
		

Fabric Preparation

Desized jeans fabrics before stitching. Most fabrics are already desized because they are old and washed for many times. But some may not desized, so it is necessary to desized all of them to prevent from shrinkage. After desizing, the fabric is ready to stitch. Cut the waste jeans fabric of size 4.5 x 4.5 inches into patch form.

Footwear

First, make a shape of foot on form that can be seen in figure 17 and place that form onto the cardboard then cut it accordingly as shown in figure 18.

Figure 17 Cut form to the shape of foot	*Figure 18* Cardboard & form for the sole of footwear	*Figure 19* Thickness of sole
		

Paste two pieces of cardboards together to form a thick sole and stick forming sheet in carboard of lower side with glue as figure 19 shows.

Now make braid of purple and peach color waste cotton fabric strips as figure 20 & 21 shows.

Figure 20 Strips of waste cotton fabric	*Figure 21* From strips of waste cotton fabric make simple braid	*Figure 22* Pasting on sole of footwear	*Figure 23* Sole of footwear is ready now
			

Stick them with glue in round shape one by one on the upper side of cardboard as shown in figure 22. The sole of shoe is ready with thickness ¾ inch that can be seen in figure 23.

Now cut the stiff jeans fabric of 3 x 6 inch and cover it with purple color cotton fabric. Make a bow with that purple color rectangular strap as shown in figure 24. Paste that ready strap on the sides of sole as shown in figure 25.

Figure 24 Side bow for strap of footwear	*Figure 25* Paste the ready strap	*Figure 26* Make ¾ inch strip to cover the sides of sole	*Figure 27* Pasting purple fabric strip to the sides of sole for final neat look
			

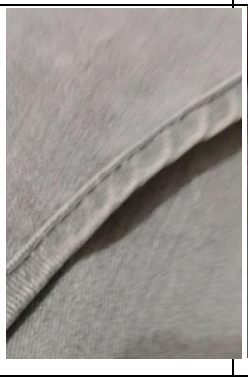
Make a strip of ¾ inches to cover the boundary of footwear shows in figure 26 & 27.

Now decor the straps of both footwear with some pearls and then it is ready to wear as shown in figure 28 & 29.

Figure 28 Ready to wear	*Figure 29* Ready to wear
	

Sample

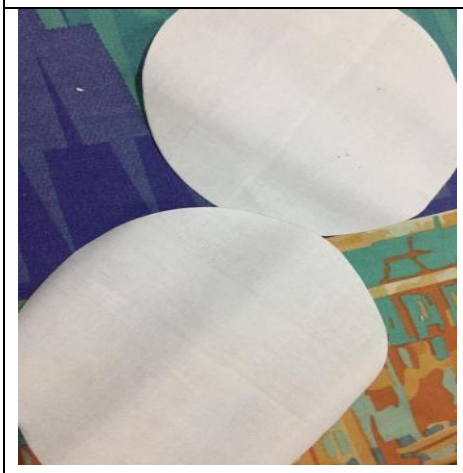
Sample for making footwear include old waste cotton of purple and peach color that shown in figure 30, stiff jeans as shown in figure 31, figure 32 shows some pearls, forming sheet that shows in figure 33 and cardboard that can be seen in figure 34.

Figure 30 Old waste on fabric	*Figure 31* stiff jeans for strap	*Figure 32* Pearls to enhance footwear	*Figure 33* Form for the sole of footwear	*Figure 34* Cardboard for the sole of footwear
				

Fabric Preparation

Cut the strips of old waste cotton fabric and then make braid from those strips. Cut 3 x 6 inches stiff jeans fabric with 1 cm seam allowance.

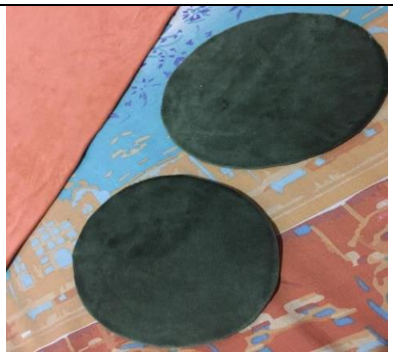
Hand bag

Figure 35 Form for the sole of footwear	*Figure 36* Cut circles of buckram as interfacing	*Figure 37* Cut circles of buckram as interfacing
		

Cut two circles of 5.8 inches of Buckram as shown in 35.

Take the zip and make its length to 11.5 inches. Paste the waste white cotton fabric on the circled Buckram with iron inside that can be seen in figure 36. Cut another Buckram of 18.5 inches x 11.5 inches. Now paste that white cotton fabric inside to that Buckram as shown in figure 37.

Now cut orange velvet waste fabric into 18.5 inches x 11.5 inches with 1 cm seam allowance from each side and paste it to the outer side of the buckram that shows in figure 38.

Figure 38 Cover the rectangle interfacing with orange velvet fabric	*Figure 39* Cover the round interfacing with green velvet fabric	*Figure 40* Attach the zip
		

Now paste another velvet fabric of green color to the outer side of both rounded buckram pieces as shown in figure 39.

Sew the rounded buckram pieces with the rectangle piece of buckram and also sew zip upside that can be seen in figure 40.

Now turn out to take velvet outside that shows in figure 41.

Figure 41 Round shape bag is almost ready	*Figure 42* Above look	*Figure 43* Now attach the chain as handle of bag and some pearls to enhance handbag and then it is ready to wear
		

Figure 42 shows above look of handbag.

Sew the chain on both rounded sides as handle of the bag and decorate the bag with pearls then it is ready to wear as shown in figure 43.

Sample

Sample for making handbag include waste velvet fabric in green and orange color that shows in figure 44, buckram, zip, white cotton fabric, chain as in figure 45 and figure 46 shows some pearls.

Figure 44 Old waste velvet fabric in green and orange color	*Figure 45* Chain for the handle of the bag	*Figure 46* Pearls to enhance the handbag
		

Fabric Preparation

Cut two circles of 5.8 inches of buckram and two circles of green velvet fabric of also 5.8 inches with 1 cm seam allowance. Cut another Buckram of 18.5 inches x 11.5 inches. Cut orange velvet fabric into 18.5 inches x 11.5 inches with 1 cm seam allowance from every side.

Research Design

This study is a based on quantitative research. This is experimental research. This study used descriptive survey method used to assess under graduated and graduated students, preference of students in choosing recycled items from old waste fabrics. The respondents of this study came from LCWU student's age limit 20 to 23 of different departments.

Sampling Strategy

In this study, random sampling is used to select samples from 35 students of different departments of LCWU. The instrument used was a questionnaire to gather the needed data. The draft of the questionnaire was drawn out based on the researcher's readings, previous studies, professional literature, published and unpublished thesis relevant to the study. Close-ended options were provided in questionnaire. In this way, the instrument is authorized to obtain valid responses of the students. The student responses were given enough time to answer the questions.

Results

This deals with results of recycling through pie chart and histogram after collecting data of questionnaire from LCWU students of different departments. In this study recycled jacket, handbag and footwear is made with old waste jeans, velvet and cotton fabric. Following is given the analysis and interpretation of data as per sequence of the objectives.

Objective 1

To find waste fabrics and recycle them into a new textile material.

This study found 3 waste fabrics including old jeans, velvet and cotton. With these waste fabrics, new textile materials are formed. In this study, waste jeans fabric was used to make new jacket, waste velvet fabric was used to make new handbag and waste cotton fabric was used to make new footwear.

Figure 47 Found old waste jeans fabric	*Figure 48* Recycled jacket from old waste jeans fabric
	
Figure 49 Found old waste cotton fabric	Figure 50 Recycled footwear from old waste cotton fabric
	
Figure 51 Found old waste velvet fabric	*Figure 52* Recycled handbag from old waste velvet fabric
	

Objective 2

To convert old jeans pent fabric into jacket.

The old waste jeans fabric was recycled to make new jacket in this study. Jacket was made with some

small patches of dark blue, sky blue and grey jeans. To enhance the beauty of jacket, lace, buttons and some beads was used. So, in this study, old waste jeans fabric was converted into new jacket through recycling.

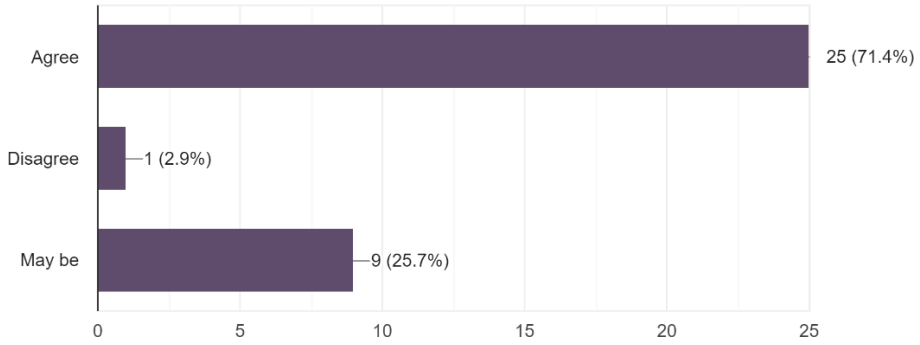


Figure 53 Recycled jacket is attractive

In this study, 71% students agree that the recycled jacket is attractive and only 2% disagree about that. Other 25% students think that the recycled jacket is may be attractive.

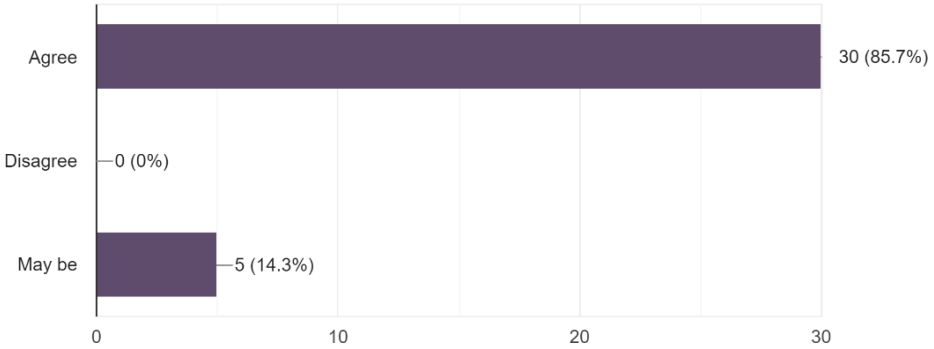


Figure 54 Recycled jacket is easy to wear

In this study, 85% students agree that the recycled jacket is easy to wear and no one is disagreed about that. Other 14% students think that the recycled jacket is may be easy to wear.

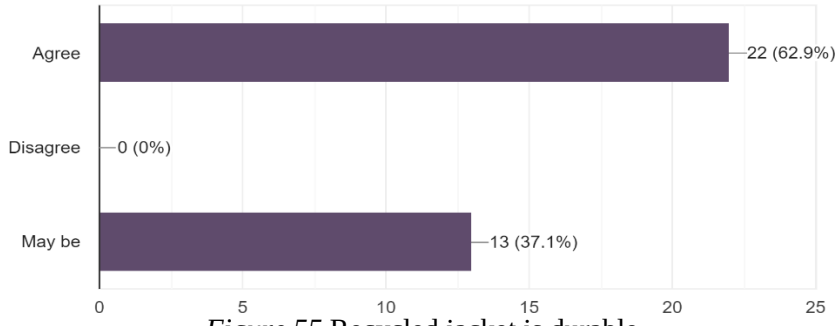


Figure 55 Recycled jacket is durable

In this study, 62% students agree that the recycled jacket is durable and no one is disagreed about that. Other 37% students think that the recycled jacket is may be durable.

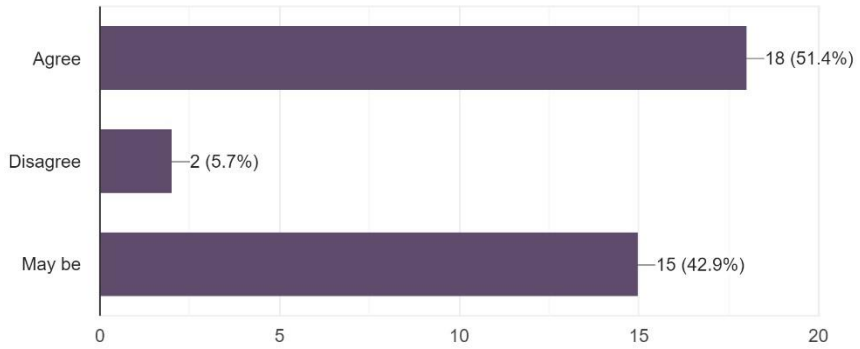


Figure 56 Jeans fabric is appropriate for recycled jacket

In this study, 51% students agree that the jeans fabric is appropriate for recycled jacket and only 5% disagree about that. Other 42% students think that the jeans fabric is may be appropriate for recycled jacket.

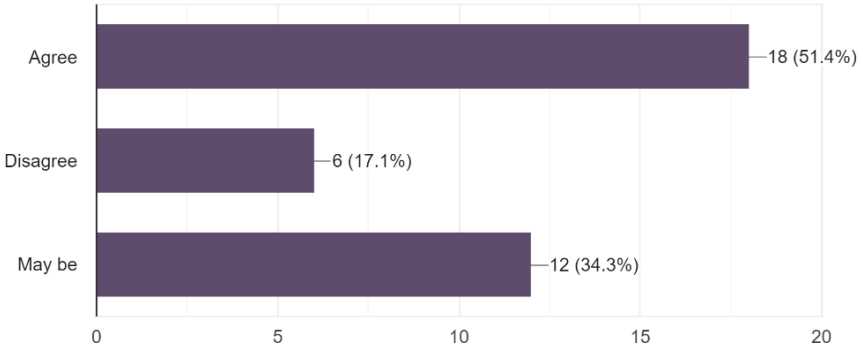


Figure 57 Students prefer recycled jacket

In this study, 51% students prefer the recycled jacket and only 17% disagree about that. Other 34% students think that they may be prefer the recycled jacket.

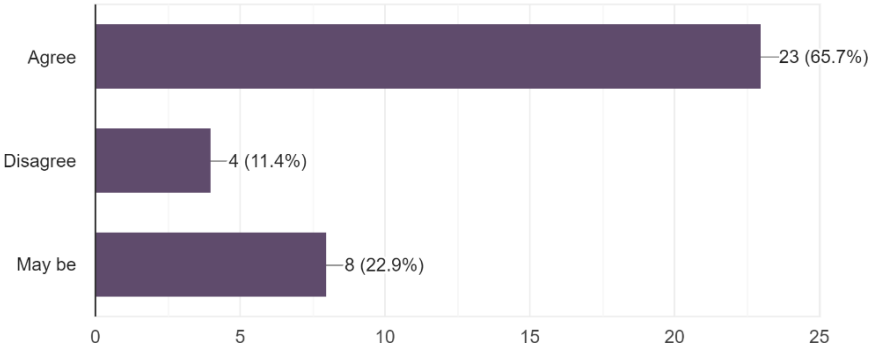


Figure 58 Color combinations used in recycled jacket is pleasing

In this study, 65% students agree that the color combination used in recycled jacket is pleasing and only 11% disagree about that. Other 22% students think that the color combination used in the recycled jacket is may be pleasing.

Objective 3

To convert old cotton fabric into footwear.

In this study, old cotton fabric was used to make footwear. Cotton waste fabrics in purple and peach colors was used in making simple braid for the sole of footwear. For making the sole of footwear,

cardboard and form was also used for durability of footwear. Also, in this study, some pearls were used to enhance the beauty of footwear. So, in this study, old cotton fabric was converted into new footwear through recycling.

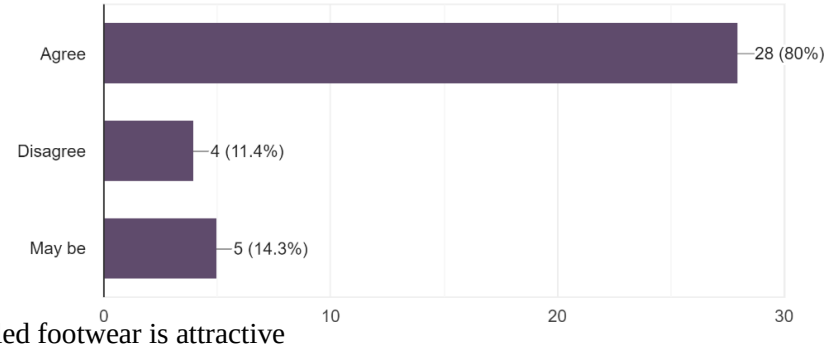


Figure 59 Recycled footwear is attractive

In this study, 80% students agree that the recycled footwear is attractive and only 11% disagree about that. Other 14% students think that recycled footwear is may be attractive.

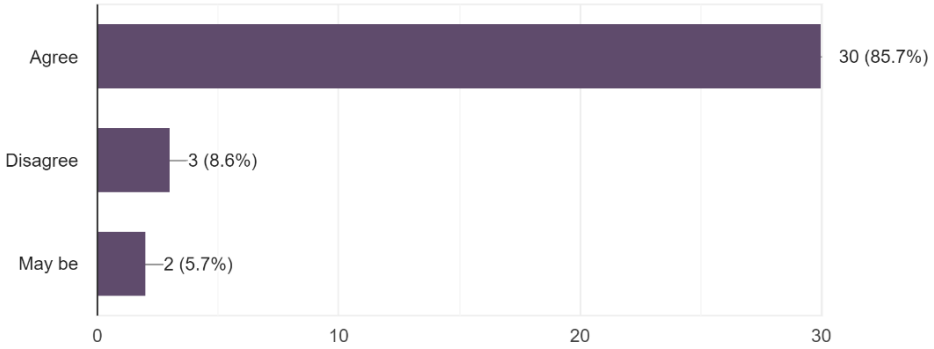


Figure 60 Recycled footwear is easy to wear

In this study, 85% students agree that the recycled footwear is easy to wear and only 8% disagree about that. Other 5% students think that the recycled footwear is may be easy to wear.

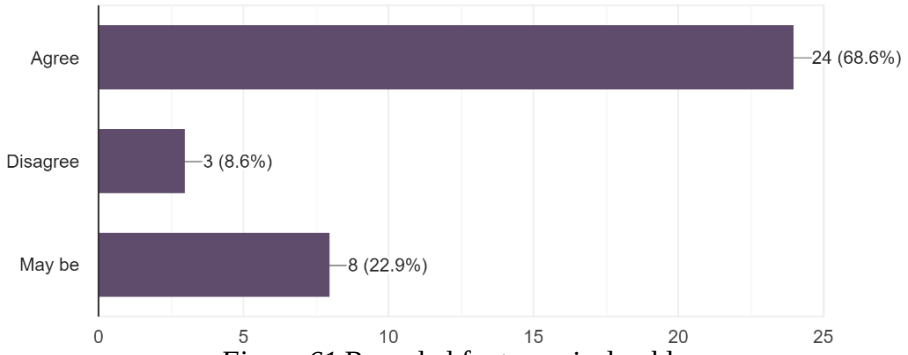


Figure 61 Recycled footwear is durable

In this study, 68% students agree that the recycled footwear is durable and only 8% disagree about that. Other 22% students think that the recycled footwear is may be durable.

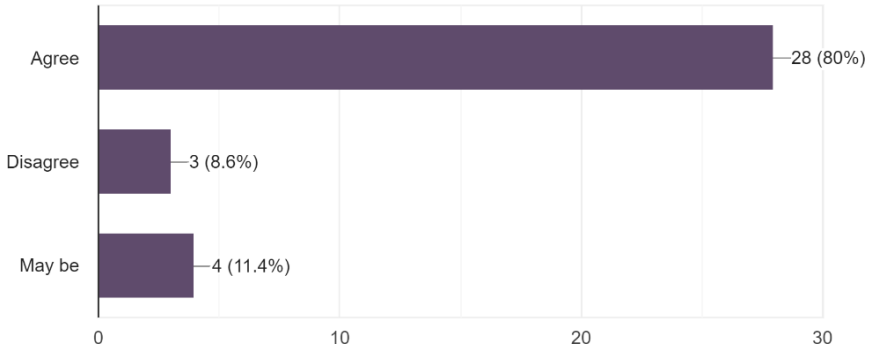


Figure 62 Cotton fabric is appropriate for recycled footwear

In this study, 80% students agree that the cotton fabric is appropriate for the recycled footwear and only 8% disagree about that. Other 11% students think that the cotton fabric is appropriate for the recycled footwear.

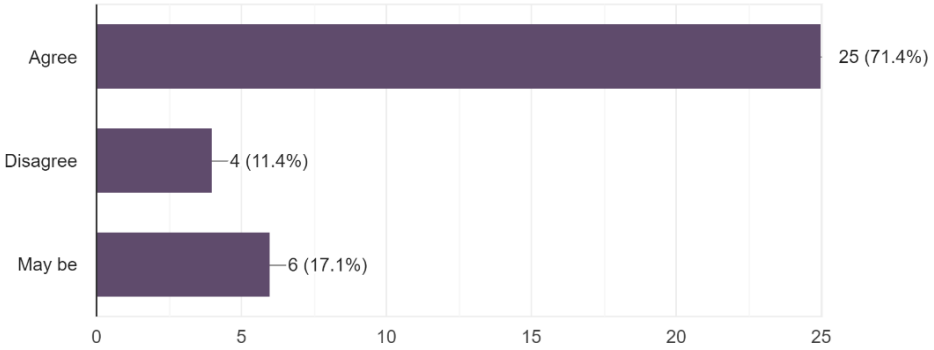


Figure 63 Students prefer recycled footwear

In this study, 71% students prefer recycled footwear and only 11% disagree about that. Other 17% students think that they prefer recycled footwear.

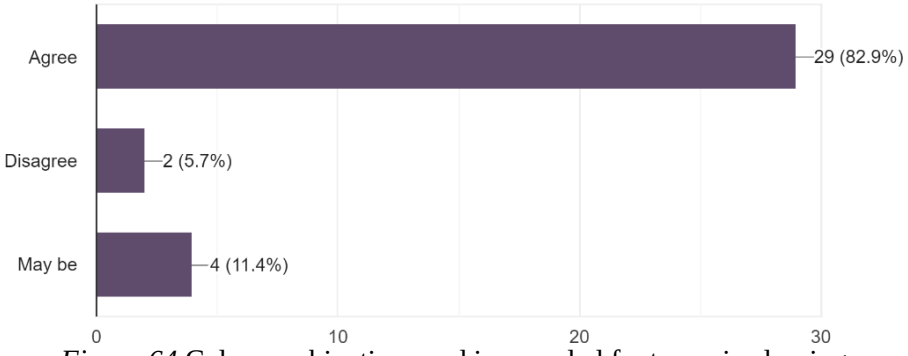


Figure 64 Color combination used in recycled footwear is pleasing

In this study, 82% students agree that the color combination used in recycled footwear is pleasing and only 5% disagree about that. Other 11% students think that the color combination used in the recycled footwear is may be pleasing.

Objective 4

To convert old cotton, buckram and velvet fabrics into hand bag.

The study was also used to make handbag with old velvet, cotton and buckram. Main fabric that was used to make handbag was velvet. Cotton was used in the inner side of handbag and buckram was used for the

stiffness and durability of handbag. In the recycling of handbag, some pearls were also used for enhancing the beauty of handbag. Chain was used as the handle of the bag. So, in this study, old cotton, buckram and velvet fabric was converted into handbag.

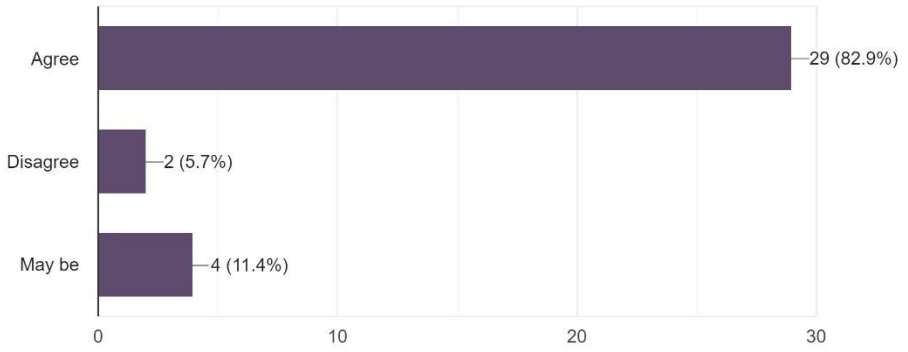


Figure 65 Recycled handbag is attractive

In this study, 82% students agree that the recycled handbag is attractive and only 5% disagree about that. Other 11% students think that the recycled handbag is may be attractive.

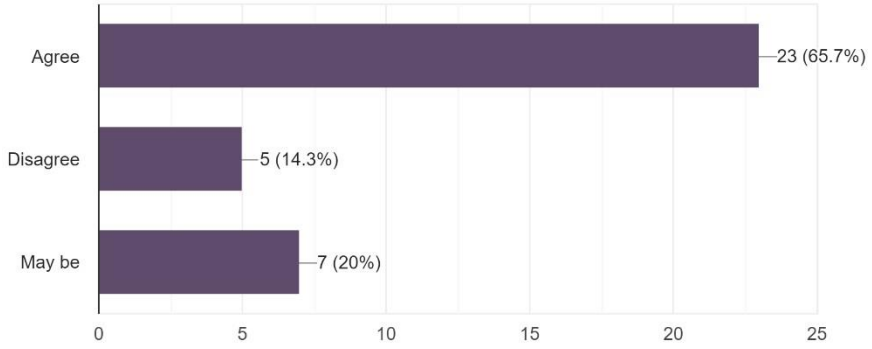


Figure 66 Recycled handbag is easy to carry

In this study, 65% students agree that the recycled handbag is easy to carry and only 14% disagree about that. Other 20% students think that the recycled handbag is may be easy to carry.

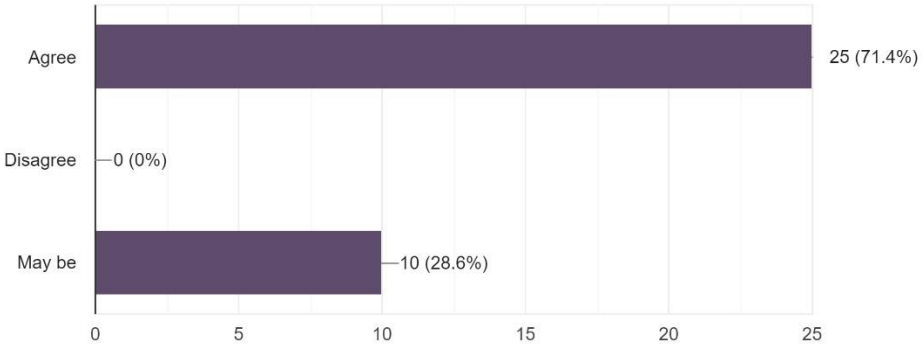


Figure 67 Recycled handbag is durable

In this study, 71% students agree that the recycled handbag is durable and no one is disagreed about that. Other 28% students think that the recycled handbag is may be durable.

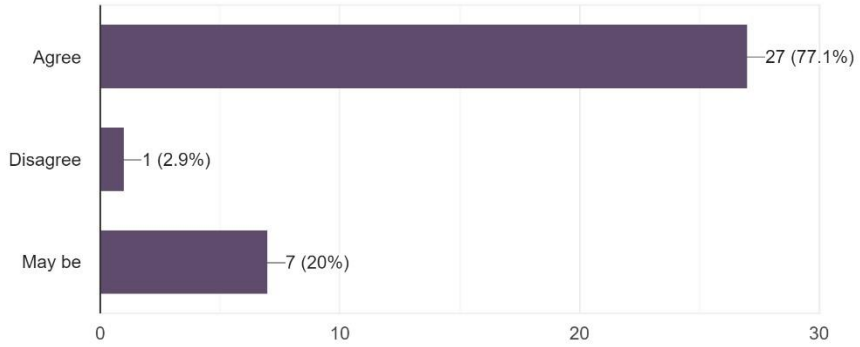


Figure 68 Velvet fabric is appropriate for recycled handbag

In this study, 77% students agree that the velvet fabric is appropriate for recycled handbag and only 2% disagree about that. Other 20% students think that the velvet fabric is may be appropriate for the recycled handbag.

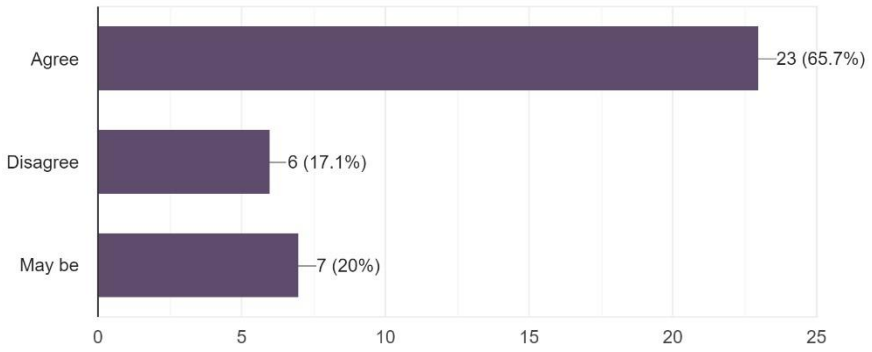


Figure 69 Students prefer recycled handbag

In this study, 65% students prefer recycled handbag and only 17% disagree about that.

Other 20% students think that the they may be preferred recycled handbag.

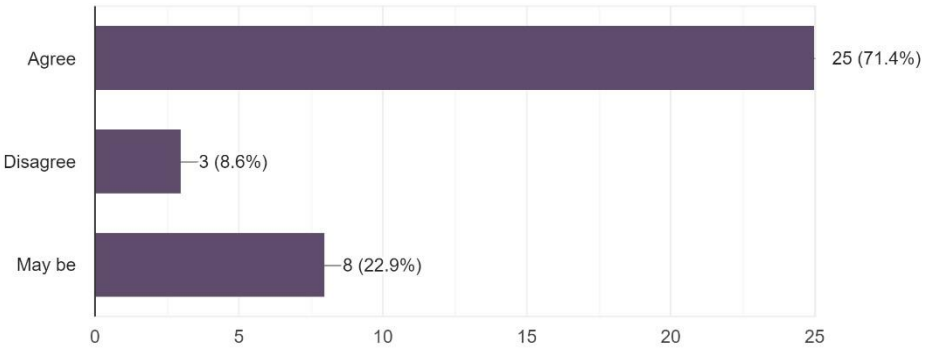


Figure 70 Color combination used in recycled handbag is pleasing

In this study, 71% students agree that the color combination used in recycled handbag is pleasing and only 8% disagree about that. Other 22% students think that the color combination used in the recycled handbag is may be pleasing.

So, the majority of students agreed with the beauty, durability, color combination and fabric of recycled

jacket, footwear and handbag.

Objective 5

To analyze the new textile materials by questionnaire. (Pictorial analysis).

For analyzing new recycled jacket, footwear and handbag, questionnaire was made and distribute it through online medium to LCWU students age limit between 20 to 23 of graduated and under graduated from different departments randomly. For data analyzing, pie chart and histogram was used. Results of those questionnaire from 35 respondents are given below:

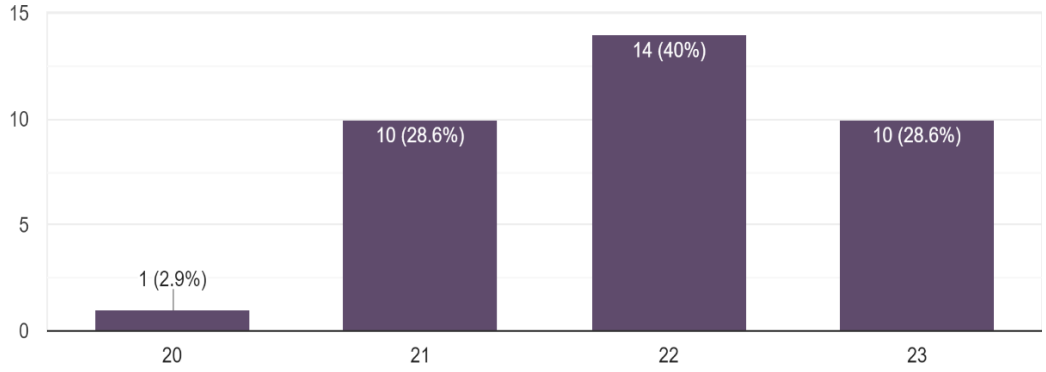


Figure 71 Students age limit

Data collected from LCWU students age limit was between 20 to 23.

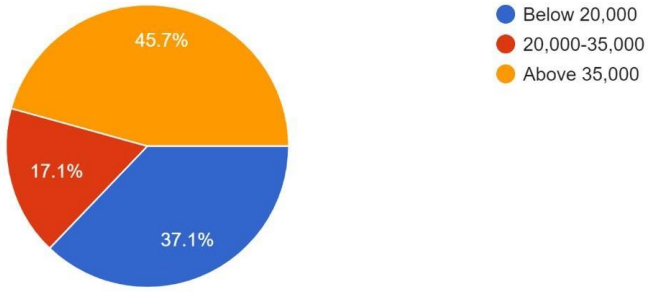


Figure 72 Student's monthly income

Majority student's monthly income is above 35,000. 45% student's monthly income is above 35,000. 37% student's monthly income is 20,000 to 35,000 and 17% student's monthly income is below 20,000.

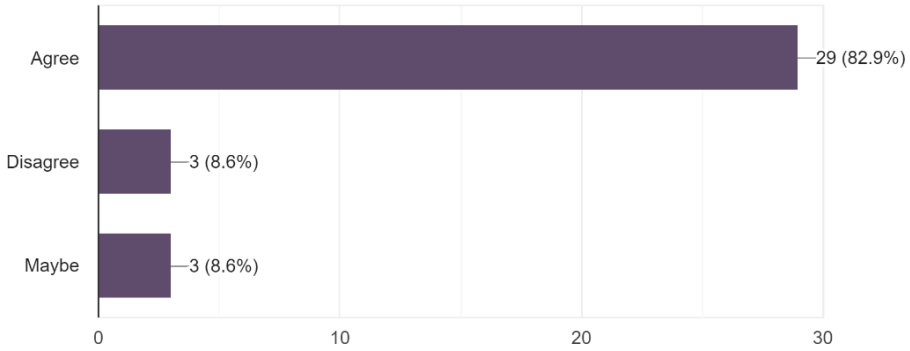
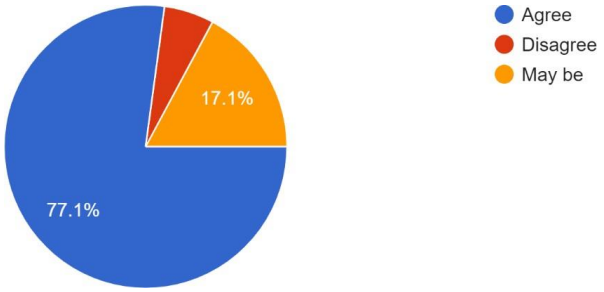


Figure 73 Recycling old textile waste is better than get rid of too bin

After viewing recycled jacket, handbag and footwear, 82% students agree that recycling old textile waste is better than get rid of too bin and only 8% students are disagreed about them. Other 8% students think that recycling old textile waste is may be better than get rid of too bin.

Figure 74 This study gives more creative ideas for recycling old clothes



77% students are agreed with this study that it can give more creative ideas for recycling old clothes and only 6% students are disagree about them. Other 17% students think that this study may be gives more creative ideas for recycling old clothes.

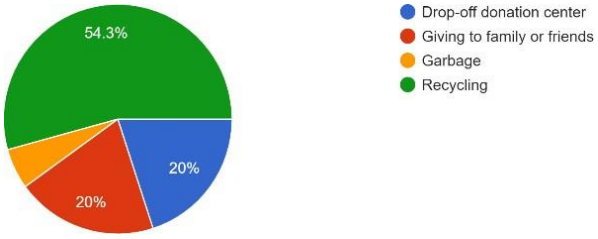
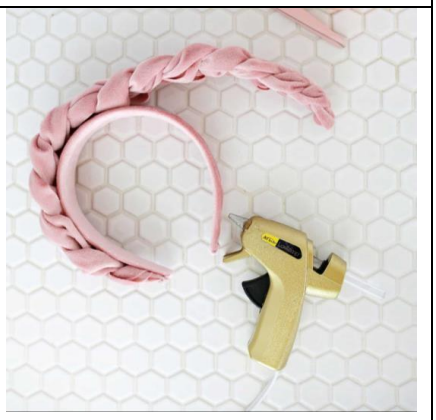


Figure 75 Most suitable method for discarding used textiles

Recycling is the most suitable method for discarding used textiles to 54% of students after seeing recycled products which include jacket, handbag and footwear. 20% students think that giving to family and friends is most suitable method for discarding used textiles. Other 20% students think that the most suitable method for discarding used textiles is drop-off donation center and for other 6% students, the most suitable method for discarding used textiles is garbage.

Discussion

Cristina Garay make pillow case from old damaged jeans by using sewing machine. The project of Cristina Garay only required one side of one leg part from three jeans. Strips were cut to fit the size of the pillow. Then she sews those long strips as patches and make a pillowcase by stitching strips of old waste one leg part of jeans (Garay, 2021).

Figure 76 Cristina Garay recycled pillowcase	*Figure 77 R*ecycled jacket	*Figure 78* Recycled head band by Laura Gummerman
		

In this study, jacket is made from old waste jeans also by using sewing machine. Three colors of waste jeans are used same as Cristina Garay, but the difference is; jacket is formed by cutting square pieces then sew all those pieces in patch form and in last stitch jacket from new fabric that is made from old jeans patches rather than make a pillowcase from long strips of old jean

In another study, Laura Gummerman makes a braided head band from old waste velvet. She just makes a simple braid from velvet strips then paste it on plain hairband (Gummerman, 2020).

And in this study, handbag is made from old waste velvet fabric with orange and green color waste fabric.

Figure 79 Recycled handbag	*Figure 80* Recycled rug by Cintia	*Figure 81 Recycled* footwear
		

Cintia make braided rug from old cotton fabric. She cut the strips of waste fabric and make a braid from those cotton strips. Then sew it together to make a rug (Cintia, 2019).

In this study, footwear is made from old cotton fabric. First make a braid from cotton waste fabric and paste it in sole of footwear. Then make a bow from waste cotton fabric for the strap of footwear. So, in this study old waste cotton fabric braid is used in footwear rather than to make rug.

Conclusion

The fibers obtained by recycling are generally evaluated in the production of lower- value products compared to the original product. However, nowadays, Recycling fibers have started to increase their evaluation in high value-added products. On the other hand, the perspective that focuses only on the cost aspect of the production of recycled garments is not correct. So, recycling of textiles and garments is of great importance in terms of reducing the use of natural resources (e.g., water used to grow seeds or oil used in the production of synthetic fibers). Recycling will also save energy and chemicals to produce new textiles, as well as prevent pollution from the production process. People can learn the importance of recycling. Recycled jeans make insulation to help keep someone warm during the winter.

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Conflict of Interest

Authors declared no conflict of interest.

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