

To Create Social Consciousness towards Food Waste through Digital Designing and Fusion Printing Method

Dr. G. Malarvizhi¹, L. Poornima Valliammai Lakshmi²

¹Associate Professor, Department of Costume Design and Fashion, Dr. N.G.P. Arts and Science College, Coimbatore, India.

²Student, Department of Costume Design and Fashion, Dr.N.G.P. Arts and Science College, Coimbatore, India.

Abstract

The paramount step towards the change is creating awareness. Awareness precedes change. As awareness around the issue of food waste has grown, various types of interventions to reduce food waste have emerged. In this article, the design and printing of a polyester cloth with a chest pattern that contains no food waste is discussed. The primary goal of this product is to make everyone who wastes food feel guilty. This article is mainly divided into three parts. Firstly, the garment's chest print design, which represents farmer's protests and hardships was conceptualized. The idea is further developed concerning farmers who do agriculture despite adverse weather. Food waste has a significant impact on farmers, who invest time, money, and effort in producing food that goes uneaten. Second, the garment's back print design was made with the idea that every bite matters. It's important to consider what they eat now. Additionally, the back design makes clear that food waste makes hunger worse since millions of people worldwide suffer from a lack of nutrient-dense food and end up starving. Using Corel Draw (computer-aided design), the front and back pattern designs are created. Finally, the printing process is done using Fusing print on a Polyester fabric and then converted into an M-size T-shirt. Then the fabric is given to the testing process, which is then confirmed that the polyester T-Shirt is user-friendly. To evaluate the product and the design, color fastness testing has been done. To male and female college students the samples are given, which are uploaded in questionnaire forms for the subjective test results.

Keywords: Food waste, food loss, hunger sufferings, Polyester fabric, fusing, subjective result.

INTRODUCTION:

Imagine going to the market, leaving with three full bags of groceries, and coming home. After

a few weeks, you know that one bag is fully not used and the groceries got spoiled so you throw that bag into a trash bin, which later is hauled away to a landfill. What a waste. Collectively, that is exactly what we are doing today. Globally, 30 to 40 percent of food intended for human consumption is not eaten. More than 800 million people go hungry every day. The world joins together to commemorate World Food Day on October 16th each year. This World Food Day is a potent reminder of how important food is to our existence. Food is not just a means of subsistence but also a basic human right and a component of cultural identity. This product highlights the difficulties faced by farmers and hungers, as well as the group efforts to end hunger worldwide. In India, 40% of food produced is never eaten and thrown away close to 100 Million Tons. Globally 1.3 Billion tons are wasted. Is there a crossroads between food waste and feeding the hungry? The other question is what is this food waste doing to our environment and economy? This product brings out the challenges that farmers and hungers face, and the collective efforts to create a world where no one goes hungry.

MATERIALS AND METHODS:

SELECTION AND PROCESS OF PRINTING METHOD:

CHEST PRINT: The Illustration is designed with the farmer's struggle of carrying out agriculture in spite of wasting food by others. Food waste impacts not only the hungry but also the farmers who grow the food, from planting to harvesting.

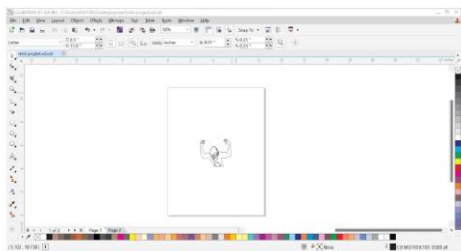


Fig. No.1: Farmer's struggle

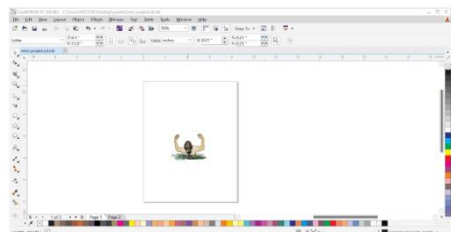


Fig.No.2: Tinting of the illustration

Fig.No.2: Tinting of the illustration

A kisan mahapanchayat, or massive meeting of farmers, held by the Samyukt Kisan Morcha, a coordinating coalition of the protesting farmers' groups, to demand that the Centre fulfill its obligations regarding a bill that would secure minimum support prices for all crops and to charges brought against demonstrators during the uprising should be withdrawn.

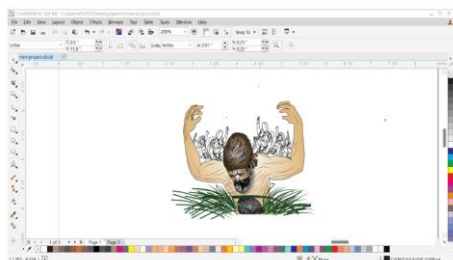


Fig.No.3: Farmers protest (Kisan mahapanchayat protest at Delhi)

PANTONE COLOR USED:

- Pantone192 C [Ruby red]
- Pantone 728C
- Pantone 654321[dark brown]
- Pantone 021 C [orange]
- Pantone 15-1214 TCX [sand colour]
- Pantone 1215C
- Pantone 5255C
- Pantone 532C
- Pantone 7533C

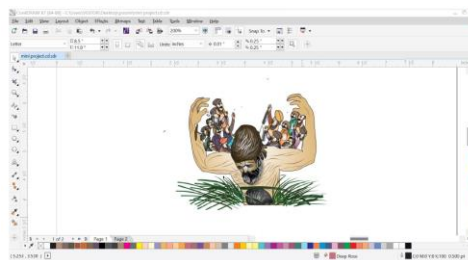


Fig.No.4: Filling of Pantone shades of angry Farmers on protest

PANTONE COLOUR USED:

- Pantone 7508C
- Pantone 7533C
- Black
- Pantone 553C
- Pantone 18-1112TCX [Walnut shade]

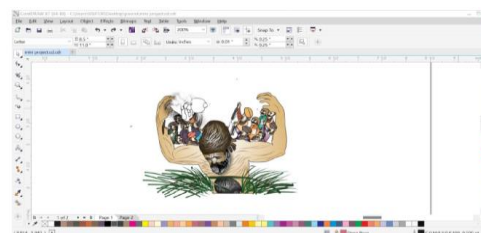


Fig.No.5: Farming method (Harvesting)

Following the demonstrations, I constructed a farming process that demonstrates the value of every mouthful of food because Certain crops thrive in particular seasons, some of which are not, yet all types of crops are grown for the market. Despite certain weather conditions, all types of crops are gathered throughout the year, thus it is crucial to not waste any fruit or vegetables.



Fig.No.6: Filling the pantone colours for the women harvesting

PANTONE COLOR USED:

- Pantone 15-5519 TCX [Turquoise]
- Pantone C724B1 [Neon purple]
- Pantone192 C [Ruby red]
- Pantone 012 C [Deep yellow]

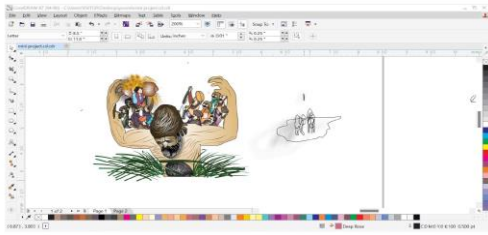


Fig.No.7: Seedling process

Seedlings are the earliest product of farming. Before being planted in the field, young plants known as seedlings are produced from seeds in the case of crops.

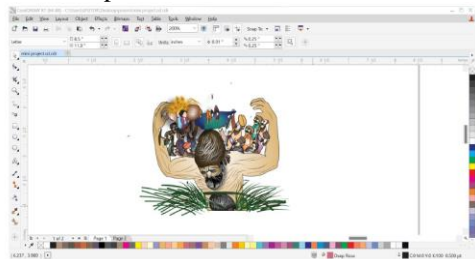


Fig.No.8: Filling pantone colours for the women who are doing seedling

PANTONE COLOR USED:

- Pantone 072 C [Blue]
- Pantone 19-3832TCX [Navy blue]
- Pantone #00ad43 [Green]
- Pantone 0631 C [Deep azure]
- Pantone 19- 3642 TCX [Purple]
- Pantone 012 C [Yellow]
- Pantone 021 C [Orange]

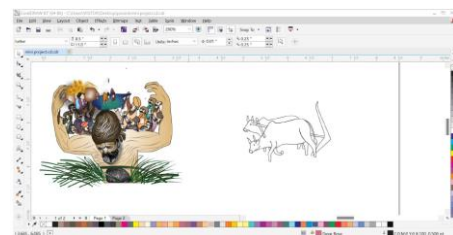


Fig.No.9: Ploughing

Ploughing is the process of loosening and turning the soil. It is also known as tilling. Ploughing of soil is important because it allows roots of the plants to penetrate deeply into the soil. This firmly roots the plant.

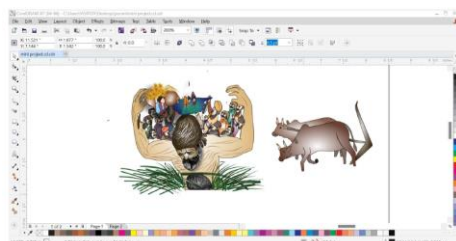


Fig.No.:10: Filling of Pantone colours

PANTONE COLOR USED:

- Pantone 192C [Ruby red]
- Pantone 439C [Dark brown]
- Pantone Trans. White
- Black

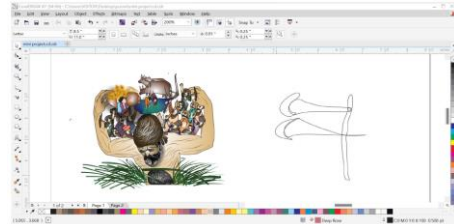


Fig. no.11: Weapon used for the panchayat or protest (ploughing tool or sticks attached together) The weapons used are rods, ploughing tool, sticks and many more.



Fig. no. 12: Filling of pantone colours to the weapon

PANTONE COLOR USED:

- Pantone 439C [Dark brown]
- Pantone 192C [Ruby red]

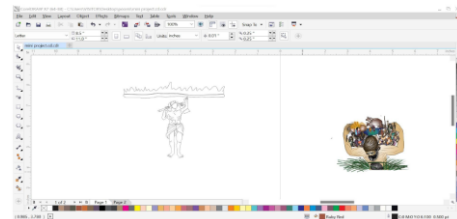


Fig.No.13: Farmer at the whole who produces food

In fig.13, Farming looks mighty easy when your plough is a pencil and you're a thousand miles from the farm field. They have learned that it is less wearing to shrug than to beat their breasts.

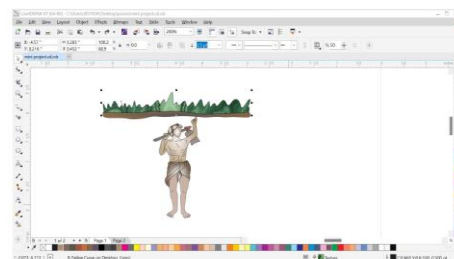


Fig.No.14: Filling of texture to the object demonstrated

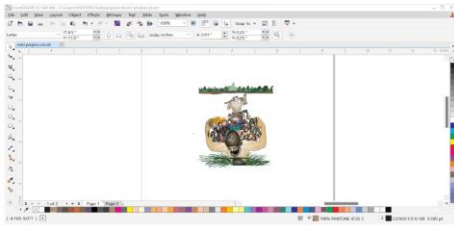


Fig.No.15: Fixation of the illustration

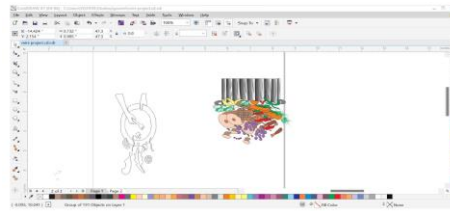


Fig. no. 20: Wasting of food



Fig. No.16: Fixing of the drawn picture as whole



Fig no.21: Hungers facing problem for eating one mouth of food.



Fig.No.17: Final chest print design

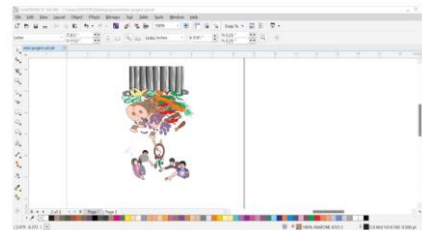


Fig. no. 22: Filling Pantone colours

PANTONE COLOR USED:

- Pantone #00ad43 [Green]
- Pantone 19-3832TCX [Ruby red]
- Pantone #622F22 [Red brown]
- Pantone 0631 C [Violet]
- Pantone 814 C [Neon purple]
- Pantone #50314C [Deep violet]
- 40% black
- Pantone13-4307TCX [Tropical pink]

BACK PRINT DESIGN:

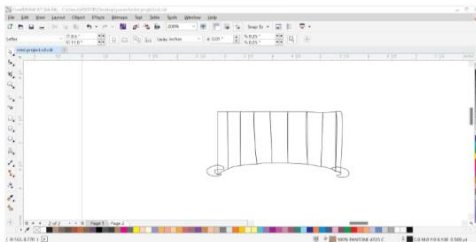


Fig. no.18: Illustration of Dustbin

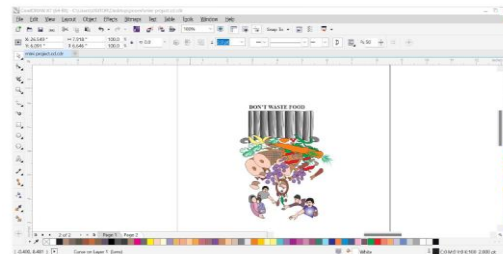


Fig. no.23: Finishing the illustration with the concept of don't waste food

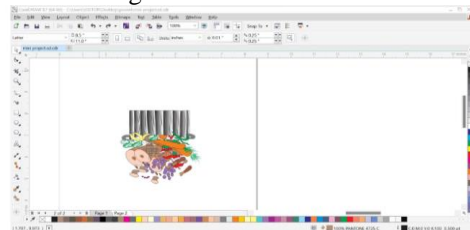


Fig. no.19: Illustration of food waste as whole by humans

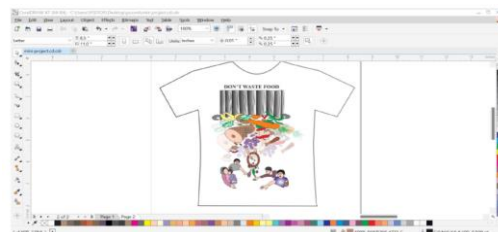


Fig.no.24: Completion of Illustration

SELECTION OF FABRIC:

One of the textiles that are frequently employed by clothing producers worldwide is polyester. This fabric's affinity for sportswear businesses stems from its adaptability for creating athletic apparel. Synthetic fabrics like polyester are typically made from petroleum. One of the most widely used fabrics in the world, this material has thousands of commercial and industrial uses. The fabric composition is the polymers derived from fossil fuels or organic sources, and the fabric's possible thread count variations are about 200-1,000, the country where fabric was first produced is the United States, and the biggest exporting/producing polyester country of today is China. Recommended washing temperatures are Cold, warm, or hot. It is commonly used in Shirts, pants, hoodies, dresses, jackets, underwear, socks, blankets, hats, sheets.

SELECTION OF PRINTING METHOD:

The technique of fusing involves applying intense heat and pressure using a heat transfer machine to transfer printed coated paper onto any fabric made of polyester. Under the name heat transfer sublimation paper, the coated paper is also available. Subsequently, fusion is worthwhile because of its many benefits. Carbon dioxide and other dangerous gasses are not released into the atmosphere during the fusing process. An inert, non-toxic gas called helium is its main by-product. High-activity, long-lived radioactive waste is not produced by nuclear fusion reactors. Substances utilized in the "first wall" facing the plasma may or may not activate components in a fusing reactor sufficiently low to allow for the recycling or reuse of the materials within a century. Approximately 150°C is when fusion occurs.

SELECTION OF GARMENT:

The selected garment is T-shirt, in which the chest print shows the farmer's struggle and the back print shows the problems faced by hungers. The T-Shirt designed resembles the sports material and it is designed with M- size, M SIZE T-Shirt: Half chest = 21 inches, Body = 28 inches Chest print is around 15 inches Back print is about 17 inches.

Two tests of Colour fastening are performed to show that polyester fabric and fusion printing method works well and user-friendly on T-Shirt they are

- i. Colour fastness to washing (2 times the testing is done)
- ii. Colour fastness to rubbing

COLOUR FASTNESS TO WASHING (ISO 105 CO6 A2S:2010)

(Modified Method) (Temp: 40°C, Liq Vol: 150ml, Time: 30 min. Steel balls: 10, Detergent: ECE: 4g/l Sod.perb :1g/l)

FRONT SIDE PRINT:

Parameters	Results	Requirement	Conclusion
Colour change	BASE : 4-5	4	PASS
Staining on Acetate	4-5	4	PASS
Cotton	4-5	4	PASS
Nylon	4-5	4	PASS
Polyester	4-5	4	PASS
Acrylic	4-5	4	PASS
Wool	4-5	4	PASS

Color Change (Grey Scale Rating): 5 – Excellent, 4 – Good, 3 – Fair, 2 – Poor, 1 – Very Poor

Staining (Grey Scale Rating) : 5 – Negligible Staining, 4 – Slight Staining, 3 – Noticeable, 2 – Considerable, 1 – Severe Staining

According to test 1 and 2 the colour fastness to washing is done for chest print results in slight staining and negligible staining for staining in grey scale rating.

BACK SIDE PRINT:

Parameters	Results	Requirement	Conclusion
Colour change	BASE : 4-5	4	PASS
Staining on Acetate	4-5	4	PASS
Cotton	4-5	4	PASS
Nylon	4-5	4	PASS
Polyester	4-5	4	PASS
Acrylic	4-5	4	PASS
Wool	4-5	4	PASS

Color Change (Grey Scale Rating): 5 – Excellent, 4 – Good, 3 – Fair, 2 – Poor, 1 – Very Poor

Staining (Grey Scale Rating) : 5 – Negligible Staining, 4 – Slight Staining, 3 – Noticeable, 2 – Considerable, 1 – Severe Staining

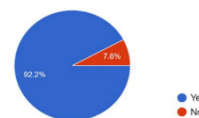
II. COLOUR FASTNESS TO RUBBING (BS EN ISO 105 X12:2016)

Parameters	Result	Requirement	Conclusion
Dry	4-5	4	PASS
Wet	4-5	4	PASS

SURVEY AND RESULT ANALYSIS:

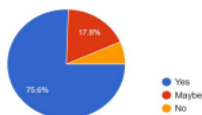
The questionnaire contains a series of written questions in the form of a Google form' about creating social awareness for no food waste. The T-shirt is been shared with college students of size group: M-size category and the Google form questions are filled by the age group of, college students who wear M-size T-shirts. The respondent's opinion is sought and it could be open and close-ended. In this, both open and close-ended questions were collected.

- 1) Do you know what food waste is and why it's a problem?



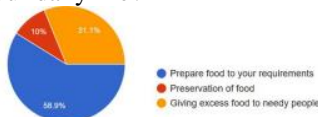
92.2% of the people know what is food waste and why it is a problem, whereas 7.8% of the people doesn't know about it.

- 2) Have you ever thought about environmental food waste?



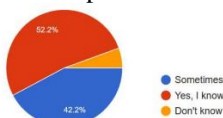
75% of the students thought about environment waste and 6.7% of students has no idea about it. There are few students [17.8%] are not sure that they know about environmental food waste.

3) What are some ways you can reduce food waste in your daily life?



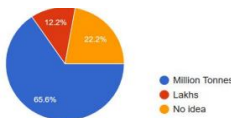
This data contains the information people how they reduce food in their daily life. 58.9% of students reduce food waste by preparing food to their requirements, 31.1% prefer to give excess food to needy people and 10% of them wants to preserve the food.

4) Do you know how to properly store and preserve food to prevent wastage?



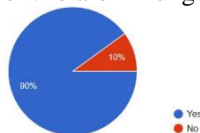
Majority [52.2%] of the students know how to properly store food and preserve food that prevents wastage of food.

5) Do you know how much food is wasted globally each year?



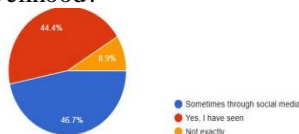
Most of the students know that every year Million tonnes of food are wasted globally. [65.6%]

6) Have you ever thought about the impact of food waste on people who are in hunger?



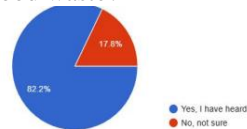
About 90% of the students know that how food waste impact on hungers whereas 10% of students doesn't know about it.

7) Have you ever considered how food waste affects farmers livelihood?



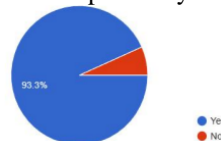
Maximum of College students know that food waste affects farmers livelihood through social media [46.7%] nearing to it 44.4% of students have seen the difficulties of farmers and very few doesn't know about it.

8) Do you know any specific challenges that farmers face due to food waste?



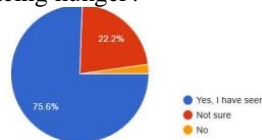
82.2% of the students know about the challenges that farmers face due to food wastage, while 17.8% of the students don't know.

9) Did my illustrations open an eye to stop food waste?



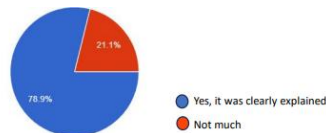
Maximum of the college students felt that my illustrations was eye opening to stop food waste. [93.3%]

10) Do you know any stories or experiences that highlight the impact of food waste on both farmers and those facing hunger?



75.6% of the students know stories which highlight the impact of food waste on farmers as well as those who are facing hunger. 22.2% of students are not sure and 2.2% of them are doesn't know.

11) Did my illustrations explain the incident of farmers' protests and their difficulties in providing food?



Majority of the students felt that my illustrations explained the incident of farmers protests and their difficulties to provide food. [78.9%]

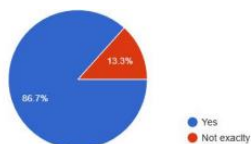
12) Was the T-shirt comfortable to wear and made you realize to not waste food?



Majority of the students felt that the T-Shirt was comfortable to wear and made them realize not to waste food. [73.3%]. 21.1% of them felt at times it

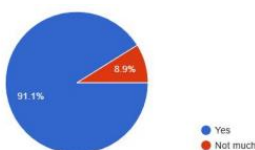
made to realize no food waste and 5.6% was not sure.

13) Do you understand the farming obstacles and the problems faced by hunger in the front pattern?



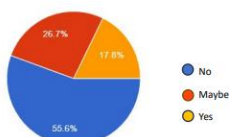
86.7% of the students understood the illustrations in the front pattern whereas 13.3% of them found that not exactly they came to know about either farming obstacles nor problems faced by hungers

14) Did the illustrations bring the guilt of waste?



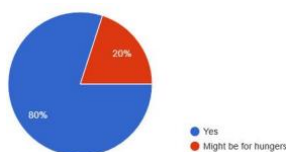
For many of the students my illustrations brought self-remorse of wasting food [91.1%]

15) Have you ever seen any T-Shirts having a deep social context of awareness towards food waste?



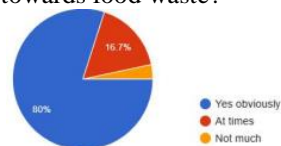
55.6% of the students haven't seen any t-shirts illustrating about the deep social context of no food waste. 17.8% of the students have seen and 26.7% of students has no idea or not sure about it.

16) Did this T-Shirt explain the consequences of farmers and hunger?



80% of the college students voted for yes, that the t-shirt explains the consequences of farmers and hungers. While 20% of them felt that it explained about only for hunger

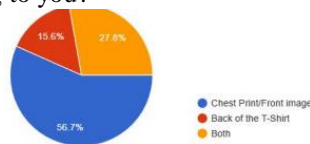
17) Did this T-Shirt give profound feelings of social awareness towards food waste?



Majority of the college students felt that the t-shirt brought profound feeling of social awareness

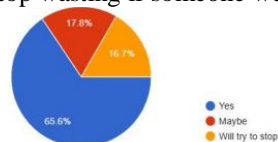
towards food waste [80%], few others felt at times [16.7%] and 3.3% of them doesn't feel much about it.

18) Which picture of the T-Shirt gave an impact according to you?



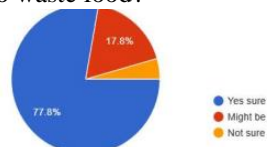
Maximum of the students voted for chest print image [56.7%] and 15.6% for back print and 27.8% for both chest print and back print.

19) Will you stop wasting if someone wears this T-Shirt?



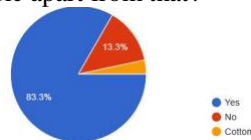
65.6% of the students will stop wasting food if they wear or someone wears it this t-shirt, 17.8% of students at times or not sure about it, 16.7% of students will try to stop wasting food.

20) Will you wear this T-Shirt to make yourself and others not to waste food?



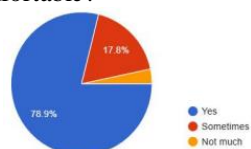
Majority of students wear this t-shirt to make others and themselves for not to waste food [77.8%], 17.8% might not be thus, they may wear it or they may not. 3.5% of them are not sure of wearing

21) Are you interested in specific fabric or material? If so, would like to wear this polyester material fabric apart from that?



83.3% of the students felt that polyester fabric is good whereas 13.3% of them felt that they were not used to it and 2.4% of the students preferred cotton fabric rather than polyester.

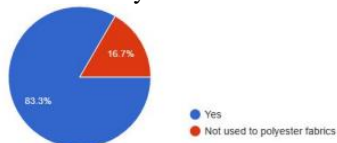
22) Did this T-Shirt material made you relaxed and felt comfortable?



78.9% of the students felt that t-shirt material made them relaxed and comfortable. 17.8% of them

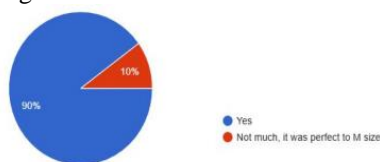
voted for sometimes not for regular usage and 3.5% of the students were not used to it.

23) Did you felt the T-Shirt was lightweight and provided ease of body movement?



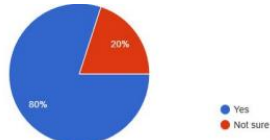
83.3% felt that the fabric is lightweight and provided ease of body movement whereas 16.7% of them are not used to polyester fabric t-shirts.

24) Does the material was resistant to stretching?



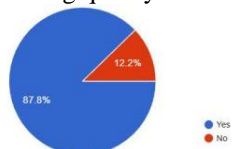
90% of the college students voted that the material used by them were was resistant to stretching. While 10% exactly fitted into their size.

25) Does it maintain its shape over time with your body measurement?



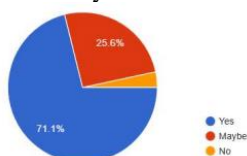
For 80% of the students the material maintained its shape over time with their body measurements whereas 20% of them not sure about it.

26) Do you feel the fabric is resistant and has durable, long lasting quality?



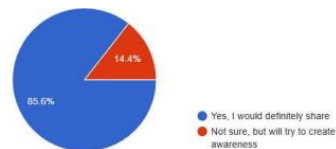
87.8% of students fabric is resistant and has durable, long lasting quality on the other hand 12.2% voted for no.

27) Will you prefer to buy this T-Shirt?



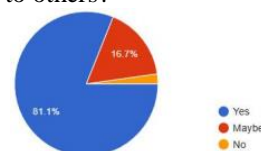
Maximum of the students voted for yes and they are willing to buy the t-shirt, 25.6% are not sure about it and very few preferred

28) Would you make awareness to people who wastes food, about the content shared in the chest print?



85.6% of the students voted for yes to make awareness for people who wastes food, about the content shared in the chest print and 14.4% of them voted for not sure, but they will try to create awareness.

29) Would you like to spread the information about the prints to others?



81.1% of the students voted for yes, that they like to spread the information about the prints to others, 16.7% of them try to intimate others.

RESULTS AND DISCUSSIONS:

The garment was given to students and asked, "What do you feel about this Chest print and back print?" the reviews and opinions of the students are as follows:

- ✓ It's a very nice project with superb content and fantabulous design. The chest print and back print are outstanding and overall it's a masterpiece
- ✓ It clearly predicts the path traveled by the farmer and not to waste the food. It is a kind of spreading awareness
- ✓ Excellent idea
- ✓ It should be more precise about the concept
- ✓ Excellent projects that will help alleviate food waste
- ✓ Chest Print was ok rather than back print
- ✓ Concept in chest print can be thought of as river to field with farmer involved in cultivating
- ✓ Good idea to bring awareness to people about food waste
- ✓ Both convey the intended message. Based on the prints I think the T-Shirt would look great and also do the work without even uttering any words.
- ✓ Good idea to create social awareness of food waste
- ✓ Creative and effective
- ✓ It is related to farmer problem
- ✓ It is related to farmer's problems and future problem
- ✓ It's a kind of spreading awareness
- ✓ Yes, it's very nice and it is perfect

- ✓ Good design work
- ✓ Feelings of the farmers and their hardship with food waste reducing
- ✓ It was an excellent ideology about the print
- ✓ People can understand how people are wasting food and how to reduce from waste of food
- ✓ It was creative and nice work
- ✓ It clearly shows the farmer's strike
- ✓ Real feel of farmers.
- ✓ Yes, it is good and brings awareness about food waste
- ✓ Good initiative
- ✓ Amazing work
- ✓ The back print was a bit confusing initially, at a closer look things were clear.
- ✓ Amazing
- ✓ Design and initiative
- ✓ It is good and effective in conveying the message to avoid food wastage.
- ✓ Good thought.

Hence, most of them felt that this T-shirt brings out awareness about no food waste, and the idea was implemented well on textiles. They also came to know about the fabric material and fusing method which made them comfortable and can use the attire regularly.

CONCLUSION:

Thus, the T-shirt is designed with the Corel Draw software which is printed using fusion printing and tested under color fastness test standards. The chest and back print of the T-shirt brought out people's self-remorse, who wastes food. The tests and survey results conclude that the illustrations are clear about the difficulties of farmers and hunger. The result analysis also concludes that polyester fabric has durability, Dry-wicking fabric, Polyester fabrics dry faster, Less prone to stains, Incredibly lightweight, Wrinkle and shrinking resistant, Inexpensive, Easy to care for, Versatile and it is recyclable fabric. Hence the concept of food waste is been explained in the form of illustrations on t-shirts which has brought contriteness to the people who waste food.

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ANNEXURE:



FRONT PRINT



BACK PRIN