Exploring Unconventional Tufting Techniques in the Context of Sustainable Bag Design

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Abstract:
The relationship between clothing and bags has evolved significantly. Today, most apparel brands develop parallel collections of bags that not only complement their clothing lines but also enhance brand value for consumers. Building on this association and the diverse range of materials available, this study focuses on using hand-tufted fabric as a primary material for accessories. This area is scarcely documented in fashion accessory design; however, there is a constant demand for creative and innovative products that exceed conventional barriers. The relationship between materials used in clothing and accessories remains largely unexplored. This research aims to explore the application of the hand-tufted technique to the design and production of bags. Six different tufted samples were produced using natural materials and applied to tote bags. These samples were assessed through a survey, and data were collected and analyzed to evaluate participants' views on the produced samples. The data analysis reveals that the hand-tufted technique is widely regarded as beneficial, enhancing aesthetic value, product marketing, and alignment with seasonal fashion trends. Additionally, the use of natural materials underscores the importance of sustainability, meeting consumer demands for eco-friendly products.

Keywords:
hand-tufting, bag design, sustainable fashion, eco-friendly materials, fashion accessories, textile innovation, environmental sustainability.

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Introduction:

Since they first appeared, bags have been associated with essential transportation needs as well as status and aesthetic connotations. This accessory has remained essential over the years, regardless of changes in trends and cultural norms. The choice of materials used in accessories, just like in apparel, determines and influences both their utilitarian and aesthetic qualities. The creation of bags involves a wide range of materials, including textiles, rubber, polymers, furs, metals, and wood.

When using fabrics, factors such as structure, mass per square meter (or "weight"), color, texture, and wearability performance attributes determine whether a piece is appropriate. One of the least frequently used materials in the creation of accessories is tufted textile fabric. Although there are many existing applications for tufted fabric, few involve fashion accessories [1]. This article explores the use of the tufted technique to produce novel, aesthetically pleasing bags.

Research problem:

The research problem addressed in this study is the difficulty faced by garment designers in presenting renewable bags design ideas that meet consumer tastes and keep pace with current trends. It is necessary to provide new insights into reaching distinct designs that can be applied to aesthetic values and take advantage of the hand tuft technique in the production of garment accessories "out tufted bags". The research problem can be summarized in the following point:

1- Alternative application techniques between hand tufting and bag design have not been investigated.
2- No scholarly or creative works have explored tufting in the context of bag design.
3- The hand-tufted technique has not gained traction in the realm of fashion design. Furthermore, investigating tufting in a new area of fashion design may yield significant benefits.

Research Importance:

The hand tufting technique has remained largely unexplored in the field of fashion design. Introducing tufting into this domain could bring significant benefits and innovations, offering a novel approach to creating unique and aesthetically pleasing fashion items with integration of sustainability into the design process.

Research Objectives:

1- Proposing a proposal to design bags for both women and men as complementary products to the textile industry, emphasizing sustainability and the utilization of sustainable and biodegradable raw materials.
2- Highlighting sustainable and biodegradable raw materials for the benefit of Egyptian

companies and institutions and exploring alternative techniques for creating fashion designs where both the design and tufting are equally significant and complementary.

1. Theoretical Outline

1.1 Hand Tufting

Hand-tufted rugs offer unique creative and technical benefits, making them a desirable choice for home design and decor.[2] They play a significant role in setting the room's ambiance and help to unify the space, creating a cohesive look by transforming the visual appearance of a room. [3], [4] Due to their handcrafted nature, hand-tufted rugs present special creative opportunities. The rug becomes a genuinely unique work of art for any room when elaborate patterns and features are added through the hand-tufting process. This degree of artistic freedom and flexibility is challenging to attain with conventional rug-making techniques.

Furthermore, the hand-tufting method enables the creation of technical effects such as carved patterns, high and low pile textures, and loop textures (Figure 1) [5]. These technological advances add dimension and depth to the designs, making the rug more visually stunning and dynamic. The combination of technical and aesthetic advances makes hand-tufted carpets a very adaptable and spectacular means of home design and decoration. This approach allows for the manipulation of the rug's surface to produce different pile heights, giving the entire design more dimension and depth. Thus, a fascinating and visually dynamic effect is created, alongside an enhanced tactile experience.[2]

Figure 1. Creating Technical Effects with Hand-Tufting Technique

Hand-tufted carpeting represents the pinnacle of elegance and skill in the realm of textile creation. A handheld tufting gun is used to punch yarn strands into a canvas or base material to create these carpets (Figures 2, 3). The exquisite motifs created by this painstaking process, which requires dexterity, artistic flair, and skill, highlight the weavers' abilities.

Using a handheld tufting gun enables greater versatility and control when crafting intricate designs. By manipulating the yarn strands, weavers can achieve various textures, colors, and shapes, creating a distinctive and personalized look for each carpet. The exceptional creativity and artistry displayed in hand-tufted carpets distinguish them from other floor coverings.

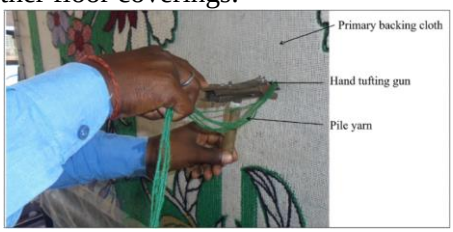

Figure 2. Tufting of Pile Yarn on Primary Backing Fabric [6]

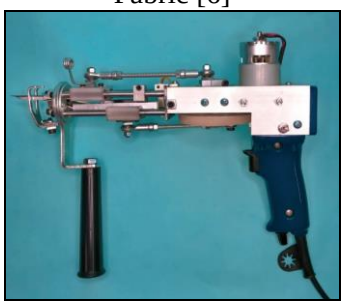

Figure 3. Hand-Tufting Gun [7]

1.2. From Carpets to Hybrid Fashion Design

It can be argued that tufting has not been explored to its full potential in the context of fashion design. As the distinct boundaries between design disciplines, such as textiles and fashion design, continue to dissolve, the profession of design is increasingly defined by flexible, evolving patterns that frequently cross, transcend, and reconfigure conceptual and disciplinary barriers [8], [9]. Hence, this evolving nature of design disciplines presents an opportunity to explore tufting more fully within fashion design.

1.3 Handbags as a Clothing Accessory

Handbags are one of the most popular accessories for women and complement every outfit. They are among the most valued products purchased by consumers because, unlike clothing, they are not changed daily. Women need handbags to carry essential items such as house keys, car keys, makeup, hairbrushes, and cell phones. Handbags are essential accessories in women's fashion, representing individual identity and character. They come in various styles, sizes, materials, and brands. The trend of wearing branded handbags has led women to spend more money to acquire the most desirable ones. Therefore, it is not surprising that most women own multiple handbags [10].

1.3.1 Design Features:

Handbags come in a variety of forms, patterns, colors, and purposes. Regardless of age, many people feel their look is incomplete without a handbag. This may explain why there are several kinds of handbags, each serving a unique purpose and suitable for various occasions. Today's market

offers a wide variety of bags, often adorned with decorations that can be personalized with clothing, scarves, shoes, and other accessories. These embellishments can also serve as creative and inventive inspiration.

There are countless varieties and styles of the latest handbags with eye-catching patterns, colors, and embellishments available today. This kind of bag is typically associated with women who enjoy switching up their handbags frequently. It's rare to see a woman without a handbag, no matter where she is in the world. Compared to men, women need bags more because they carry many essentials like makeup and personal items [10].

1.4 Sustainable Design

Sustainable interaction design considers the end-of-life of an object, exploring how we can design with sustainability in mind from the start. The concept of 'reduce, reuse, recycle,' which marked the beginnings of eco-design in the 1960s, has undergone significant change (Figure 4) [11]. In contrast to merely conserving the natural world, the revised concept of sustainable design now includes 'complementing the natural world [12], [13].

Figure 4. Waste Hierarche Step Up & Go Green

Additionally, adopting sustainable production techniques is just as important as using eco-friendly materials to promote sustainability in fashion design. This involves implementing ethical production practices, reducing the carbon footprint of clothing, and cutting back on waste production. For instance, fashion designers can boost the local economy and lessen the environmental impact of transportation by using nearby production facilities. As well, by using pattern-making procedures that maximize textile efficiency and recycling yarn remnants, they can design products with minimal waste [14].

1.5 Eco-Friendly Products

Because green products are produced using methods that do not harm the environment or require animal testing, the shift towards them will benefit the ecosystem's prosperity. People should take the initiative to select the right products, such as bags made with natural materials and eco-friendly items that have no negative impact on the environment. This is crucial because, as technology advances, industrial activities increase, which has a long-term negative impact on the environment [15].

2. Methodology and Experimental Work

The purpose of the present work is to implement the hand-tufted technique on bags to achieve aesthetic value with the concern of sustainability.

2.1. Experimental Designs for Hand-Tufting

Figures (5) to (10) illustrate the designs of the produced samples and their application on tote bags. Tote bags, characterized by their large size and parallel handles emerging from the sides are often unfastened and serve both fashion and functional purposes.

Figure 5. Sample One

Figure 6. Sample Two

Figure 7. Sample Three

Figure 8. Sample Four Figure 9. Sample Five Figure 10. Sample Six

2.2. Technical Specifications

2.2.1. Specifications of Samples under Study

The specifications of samples under Study are shown in Table (1).

Table (1) Specifications of produce Samples

No.	Property	Specifications
1	Construction	Gun Tuft
2	Pile Height	8 -14 mm.
3	Pile Weight	2.500 - 3.610 kg/ m^2
4	Total Weight	3.280 - 4.300 kg/ m^2
5	Weight of Bag	199 gm
6	Primary Backing	Polyester
7	Latex	Natural Latex

2.2.2. Pile Yarn Materials Used for Samples Produced

A group of different sustainable materials that are suitable for making bags and keeping up with fashion is used in this research. Table (2) indicates materials of pile yarns and weight of pile used for samples under study.

Table (2) Pile Yarn Materials Used for Produced Samples

No.	Sample No.	Material	Pile Weight (gm)
1	Sample One	Wool	580
2	Sample Two	Wool and Cotton	600
3	Sample Three	Wool and Viscose	591
3	Sample Four	Wool	67
5	Sample Five	Wool	58
6	Sample Six	Wool	37

2.2.3. Pile Yarn Materials Used for Samples Produced

Table (3) Pile Yarn Type Used for Samples Produced

No.	Sample No.	Pile Yarn Type
1	Sample One	Cut
2	Sample Two	Loop
3	Sample Three	Cut (Green, Orang) and Loop (Beige)
3	Sample Four	Cut (Red, Yellow Color) and Loop (Green Color)
5	Sample Five	Cut (Orange Color) and Loop (Green Color)
6	Sample Six	Loop

2.2.3.Pile Yarn Type Used for Produced Samples

Table (3) shows types of pile yarn used for produced samples.

2.3. Production Procedures of Samples under Study

2.3.1 Preparation of the Loom

The backing fabric was stretched over the loom. It was fastened using nails with considering an adequate tension to withstand the pile insertion. It is also crucial that warp and weft threads are perpendicular to each other and parallel with the wooden frames.

2.3.2. Drawing Design on the Backing Fabric

The design was drawn over the primary backing fabric in reverse. Figure (11) illustrates the designs drawn on the backing fabric.

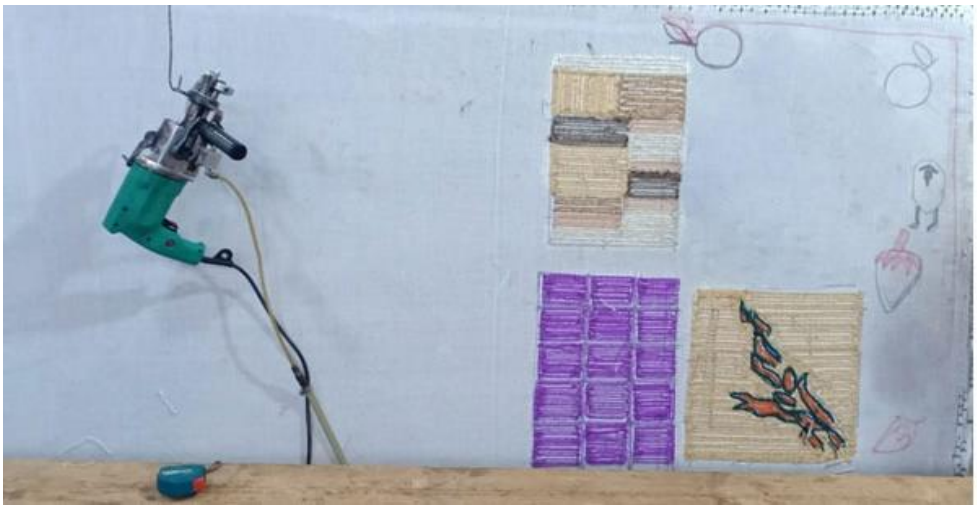

Figure 11. Designs Drawn to be Tufted

2.3.3. Insertion of Pile Yarn in the Backing

The pile threads were manually implanted into the backing fabric and matched to the required area.

2.3.4. Cutting Pile Threads

After the pile yarn was inserted into the backing fabric, it was cut to the required length by a blade. If the desired area contains loop piles, it was left uncut.

2.3.5. Applying of Latex on the Backing Fabric

After tufting process, latex was applied to hold the pile threads in place.

2.4 The Application of Hand-Tufted Designs for Bags

The following visualization portrays the 3-D presentation of applying the hand-tufted method on several types of bags.

2.4.1. Application of Hand-Tufted Technique for Handbags

Figures from (12)to (15) visualize the applying of hand-tufting on handbags.

Figure (12) Applying of Hand-Tufting on Handbags (A)

Figure (13) Applying of Hand-Tufting on Handbags (B)

Figure (14) Applying of Hand-Tufting on Handbags (C)

Figure (15) Applying of Hand-Tufting on Handbags (D)

2.4.2. Application of Hand-Tufted Technique for Luggage:

Figures from (16) to (20) depict the implementation of hand-tufting on luggage

Figure (16) Implementation of Hand-Tufting on Luggage (A)

Figure (17) Implementation of Hand-Tufting on Luggage (B)

Figure (18) Implementation of Hand-Tufting on Luggage (C)

Figure (19) Implementation of Hand-Tufting on Luggage (D)

Figure (20) Implementation of Hand-Tufting on Luggage (D)

2.4.3. Application of Hand-Tufted Technique for Laptop Bags

Figures from (21) to (28) represent the employment of hand-tufting in laptop bags

Figure (21) Employment of Hand-Tufting in Laptop Bags (A)

Figure (22) Employment of Hand-Tufting in Laptop Bags (B)

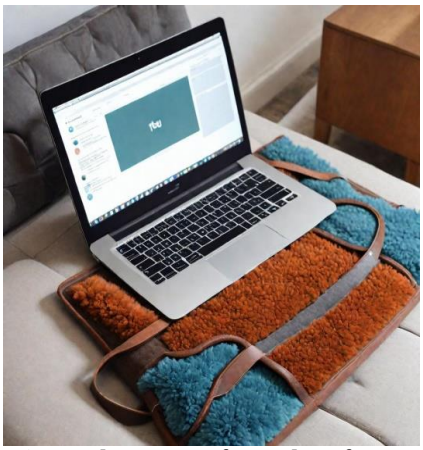

Figure (23) Employment of Hand-Tufting in Laptop Bags (C)

Figure (24) Employment of Hand-Tufting in Laptop Bags (D)

Figure (25) Employment of Hand-Tufting in Laptop Bags (E)

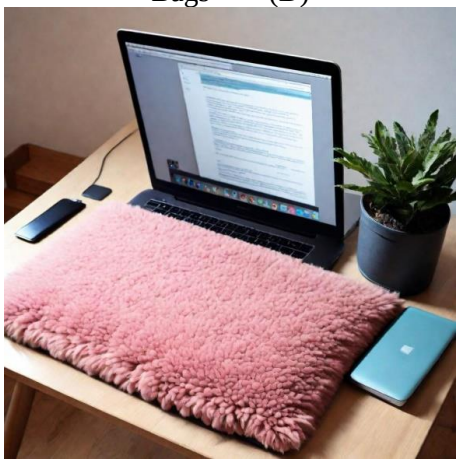

Figure (26) Employment of Hand-Tufting in Laptop Bags (F)

Figure (27) Employment of Hand-Tufting in Laptop Bags (G)

Figure (28) Employment of Hand-Tufting in Laptop Bags (H)

3. Discussion of Results

Produced samples are described and technically analyzed, and a survey is made to evaluate them.

3.1. Storyboard and Technical Analysis of Produced Designs

3.1.1. Storyboard and Technical Analysis of Design (1)

Storyboard:

The design consists of small rectangles aligned to each other in purple color.

Technical Analysis

1- The use of rectangles balances the overall design.
2- The alignment creates a cohesive look.
3- The use of purple color conveys the feel of creativity, sophistication, and luxury.

3.1.2. Storyboard and Technical Analysis of Design (2)

Storyboard:

The design consists of two columns, each containing small oblongs of varying sizes. The

colors used in the design are shades of brown, beige, and off-white.

Technical Analysis

1- Brown and beige tones form a sense of warmth, coziness, and comfort.
2- The use of neutral colors like off-white and beige can give a serene and calm atmosphere.
3- The solid brown color can evoke a feeling of stability, reliability, and grounding.
4- The use of shades can impart a sense of elegance.
5- The colors used in the design lend an organic feel.

3.1.3. Storyboard and Technical Analysis of Design (3)

Storyboard

The fluid forms of this design invite imagination and interpretation, allowing viewers to find their own meaning. It can be noticed a flowing pattern of orange and dark green that stands out against a beige background.

Technical Analysis

1- The flowing organic shapes induce a sense of rhythm and movement.
2- Using a warm color like orange suggests vitality and energy.
3- The beige background evokes a feeling of balance.

3.1.4. Storyboard and Technical Analysis of Design (4)

Storyboard

The design features a red strawberry with green leaves, embellished by small yellow accents.

Technical Analysis

1- The design of strawberry symbolizes pleasure, sweetness, and nature's freshness.
2- The green leaves and yellow accents create a harmonious balance and reinforce themes of positivity, health, and vitality.
3- The combination of warm and cool colors creates a visually engaging and attractive design.
4- The use of complementary colors (red and green) makes the design stand out.
5- Using contrasting colors creates a perception of freshness and playfulness.

3.1.5. Storyboard and Technical Analysis of Design (5)

Storyboard

The design emphasizes an orange fruit with green leaves.

Technical Analysis

1- The natural imagery of the orange fruit implies vitality, health, and natural goodness. It also conveys pleasure, abundance, and sensory delight, alongside elegance and simplicity.
2- The vibrant orange color symbolizes creativity, enthusiasm, and success.
3- The natural and organic aspect of the design is conveyed through the green leaves.
4- Oranges symbolize abundance, pleasure, and sensory delight. Their refreshing taste and bright appearance evoke feelings of joy and indulgence.

3.1.6. Storyboard and Technical Analysis of Design (6)

Storyboard

The design depicts a sheep's head and ears in black.

Technical Analysis:

1- The monochromatic palette of black against light beige makes the sheep's features stand out prominently through a stark contrast, signifying minimalism, clarity, and simplicity.
2- The design of the sheep's head draws immediate attention as a focal point, ensuring that the sheep is the core pictorial element.
3- A harmonious and balanced composition is created by the symmetrical placement of the ears and face.
4- Depicting the sheep with a simple design can suggest elegance and modernity.

3.2. Collection and Interpretation of Data

An online survey was used to assess the application of the hand-tufting technique on bags. This survey served as a quantitative tool to gather consumer opinions on the technique applied to the bags in this study. Data interpretation was conducted after collection.

Collecting of Data

1- Survey Participants

Consumers were selected as the target population for the survey conducted in this research. This is because consumers can provide insights into their interest and demand for hand-tufted bags. Additionally, they can offer valuable feedback on the appearance, craftsmanship, and perceived value of hand-tufted bags.

2- The Survey Questions

The survey was divided into two parts, encompassing both aesthetic and functional aspects. The first part consisted of ten questions assessing the proposed designs presented in the bags, while the second part focused on the produced samples

through thirteen questions. Table (4) indicates questions of the Survey.

Table (4) Indicates the Questionnaire Questions

	Part One	Part Two
Aesthetic Aspects	The achievement of an aesthetic value in designs.	
	The impact of the applied technique on aesthetic outcome of designs.	
	Does the applied technique achieve modernism and creativity and is it considered a new addition in the trend of bag design?	
	The achievement of textures through the applied technique in bag design.	
	The clarity of the basic elements in designs, and the balance for the overall composition.	
Functional Aspects	Tufted technique applied to bags is appropriate for evening attire.	Bags with tufted designs can be suitable for use as ladies' handbags.
	Hand-tufting bags suits the use with daytime outfits.	The applied technique is well-suited for use in laptop bags.
	The tufting method is suitable for use in luggage.	Applying the hand-tufting technique to bags enhances product marketing.
	The applied technique is well-suited for use in laptop bags.	The applied style is compatible with the clothing preferences of women aged 40-60.
	Applying the hand-tufting technique to bags enhances product marketing.	Hand-tufted bags aligns well with the clothing preferences of women in the 22-40 age group.
		The hand-tuft technique applied to bags is suitable for youngsters aged 13-22.
		The fitness of the applied style for autumn and winter clothing.
		The applied technique aligns well with fashion choices during seasons of summer and spring.

3.2.2. Results and Data Interpretation

3.2.2.1 Results of the Survey

A- Results of the Part One (Suggested Designs Presented in the Bags)

Aesthetic Aspects

Tables (5) to (9) indicate the results of participants regarding the aesthetic aspects of part one of the survey.

1- The Achievement of an Aesthetic Value in Designs

Table (5) Results to Question One

	Strongly Agree	Agree	Neutral	Disagree
1	50%	40%	0%	10%

2- The Impact of the Applied Technique on Aesthetic Outcome of Designs

Table (6) Results to Question Two

	Strongly Agree	Agree	Neutral	Disagree
2	50%	40%	0%	0%

3- Does the Applied Technique Achieve Modernism and Creativity and is it Considered a New Addition in the Trend of Bag Design?

Table (7) Results to Question Three

	Strongly Agree	Agree	Neutral	Disagree
3	40%	60%	0%	0%

4- The Achievement of Textures through the Applied Technique in Bag Design

Table (8) Results to Question Four

	Strongly Agree	Agree	Neutral	Disagree
4	50%	50%	0%	0%

5- The Clarity of the Basic Elements in Designs, and the Balance for the Overall Composition

Table (9) Results to Question Five

	Strongly Agree	Agree	Neutral	Disagree
5	50%	50%	0%	0%

Functional Aspects

Tables (10) through (14) present the participants' results on the functional aspects of part one of the survey.

6- Tufted Technique Applied to Bags is Appropriate for Evening Attire

Table (10) Results to Question Six

	Strongly Agree	Agree	Neutral	Disagree
6	50%	30%	20%	0%

7- Hand-Tufting Bags Suits the Use with Daytime Outfits

Table (11) Results to Question Seven

	Strongly Agree	Agree	Neutral	Disagree
7	50%	50%	0%	0%

8- The Tufting Method is Suitable for Use in Luggage

Table (12) Results to Question Eight

	Strongly Agree	Agree	Neutral	Disagree
8	30%	40%	30%	0%

9- The Applied Technique is Well-Suited for Use in Laptop Bags

Table (13) Results to Question Nine

	Strongly Agree	Agree	Neutral	Disagree
9	70%	40%	0%	10%

10- Applying the Hand-Tufting Technique to Bags Enhances Product Marketing

Table (14) Results to Question Ten

	Strongly Agree	Agree	Neutral	Disagree
10	50%	40%	0%	10%

B- Results of the Part Two (Produced Samples)

Aesthetic Aspects

The results of the survey's second part regarding aesthetic aspects are displayed in tables (15) through (19).

1- The Achievement of an Aesthetic Value in Designs

Table (15) Results to Question One

	Strongly Agree	Agree	Neutral	Disagree
Sample (1)	60%	30%	0%	10%
Sample (2)	50%	30%	10%	10%
Sample (3)	80%	10%	10%	0%
Sample (4)	60%	20%	20%	0%
Sample (5)	70%	10%	10%	10%
Sample (6)	70%	10%	0%	20%

2- The Impact of the Applied Technique on Aesthetic Outcome of Designs

Table (16) Results to Question Two

	Strongly Agree	Agree	Neutral	Disagree
Sample (1)	80%	0%	20%	0%
Sample (2)	30%	40%	20%	10%
Sample (3)	50%	20%	20%	10%
Sample (4)	60%	20%	30%	10%
Sample (5)	60%	10%	30%	0%
Sample (6)	60%	20%	20%	0%

3- Does the Applied Technique Achieve Modernism and Creativity and is it Considered a New Addition in the Trend of Bag Design?

Table (17) Results to Question Three

	Strongly Agree	Agree	Neutral	Disagree
Sample (1)	80%	10%	0%	10%
Sample (2)	50%	40%	0%	10%
Sample (3)	70%	20%	0%	0%
Sample (4)	50%	20%	20%	0%
Sample (5)	50%	20%	10%	20%
Sample (6)	70%	20%	0%	10%

4- The Achievement of Textures through the Applied Technique in Bag Design

Table (18) Results to Question Four

	Strongly Agree	Agree	Neutral	Disagree
Sample (1)	60%	30%	0%	10%
Sample (2)	50%	40%	0%	10%
Sample (3)	80%	10%	0%	10%
Sample (4)	60%	20%	10%	10%
Sample (5)	40%	40%	10%	0%
Sample (6)	60%	30%	0%	0%

5- The Clarity of the Basic Elements in Designs, and the Balance for the Overall Composition

Table (19) Results to Question Five

	Strongly Agree	Agree	Neutral	Disagree
Sample (1)	60%	30%	10%	0%
Sample (2)	50%	40%	10%	0%
Sample (3)	70%	10%	10%	10%
Sample (4)	40	30%	20%	10%
Sample (5)	50%	20%	20%	10%
Sample (6)	60%	20%	10%	10%

Functional Aspects

Tables (20) through (27) show the participants' results of part two of the survey on the functional aspects.

6- Bags with Tufted Designs Can be Suitable for Use as Ladies' Handbags

Table (20) Results to Question Six

	Strongly Agree	Agree	Neutral	Disagree
Sample (1)	80%	10%	0%	10%
Sample (2)	70%	20%	0%	10%
Sample (3)	70%	20%	0%	10%
Sample (4)	60%	20%	10%	10%
Sample (5)	70%	10%	10%	10%
Sample (6)	60%	30%	0%	10%

7- The Applied Technique is Well-Suited for Use in Laptop Bags

Table (21) Results to Question Seven

	Strongly Agree	Agree	Neutral	Disagree
Sample (1)	8%	10%	10%	0%
Sample (2)	60%	20%	20%	0%
Sample (3)	70%	10%	20%	0%
Sample (4)	60%	10%	30%	0%
Sample (5)	60%	10%	20%	10%
Sample (6)	70%	20%	10%	0%

8- Applying the Hand-Tufting Technique to Bags Enhances Product Marketing

Table (4) Results to Question Eight

	Strongly Agree	Agree	Neutral	Disagree
Sample (1)	80%	10%	10%	0%
Sample (2)	50%	40%	10%	0%
Sample (3)	80%	10%	10%	0%
Sample (4)	50%	30%	20%	0%
Sample (5)	60%	20%	20%	0%
Sample (6)	60%	30%	10%	%

9- The Applied Style is Compatible with the Clothing Preferences of Women Aged 40-60

Table (5) Results to Question Nine

	Strongly Agree	Agree	Neutral	Disagree
Sample (1)	50%	40%	0%	10%
Sample (2)	40%	40%	10%	10%
Sample (3)	60%	30%	0%	10%
Sample (4)	40%	30%	10%	20%
Sample (5)	30%	30%	20%	20%
Sample (6)	40%	30%	10%	20%

10- Hand-Tufted Bags Aligns Well with the Clothing Preferences of Women in the 22-40 Age Group

Table (6) Results to Question Ten

	Strongly Agree	Agree	Neutral	Disagree
Sample (1)	60%	20%	20%	0%
Sample (2)	50%	10%	40%	0%
Sample (3)	60%	20%	20%	0%
Sample (4)	40%	10%	40%	10%
Sample (5)	30%	30%	30%	10%
Sample (6)	40%	10%	40%	10%

11- The Hand-Tuft Technique Applied to Bags is Suitable for Youngsters Aged 13-22

Table (7) Results to Question Eleven

	Strongly Agree	Agree	Neutral	Disagree
Sample (1)	70%	10%	10%	10%
Sample (2)	60%	20%	10%	10%
Sample (3)	60%	20%	0%	20%
Sample (4)	70%	10%	10%	10%
Sample (5)	70%	10%	10%	10%
Sample (6)	70%	10%	10%	10%

12- The Applied Technique Aligns Well with Fashion Choices During Seasons of Summer and Spring

Table (8) Results to Question Thirteen

	Strongly Agree	Agree	Neutral	Disagree
Sample (1)	30%	50%	20%	0%
Sample (2)	40%	40%	20%	0%
Sample (3)	40%	40%	10%	10%
Sample (4)	60%	0%	20%	20%
Sample (5)	50%	20%	20%	10%
Sample (6)	60%	20%	10%	10%

3.2.2.2 Data Interpretation of the Survey

A- Data Analysis of the First Part of the Survey (Suggested Designs Presented in the Bags)

Aesthetic Aspects

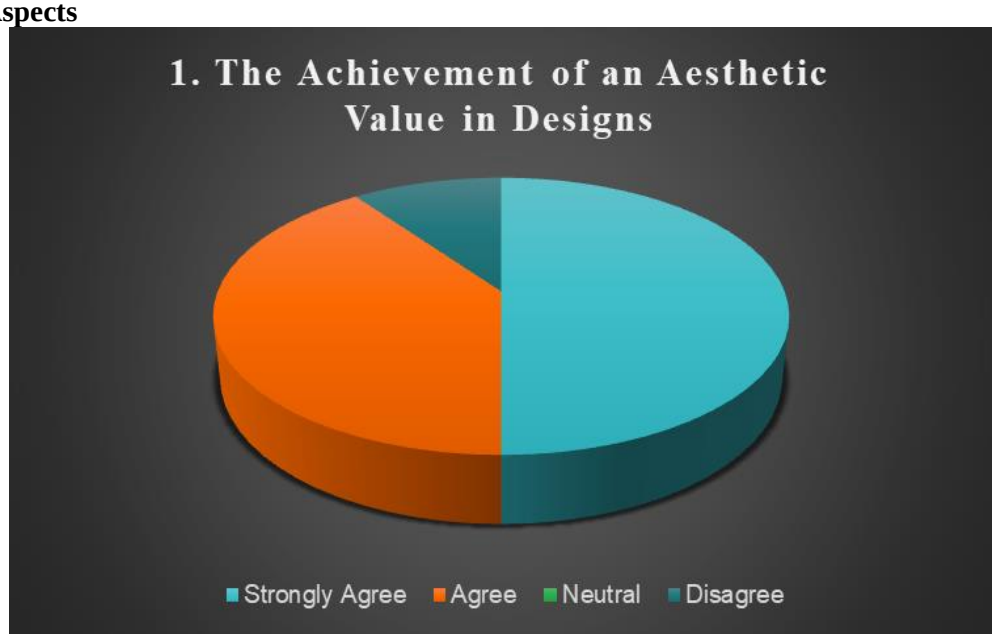

Figure 29. Responses of Consumers to Question One

Figure (29) reveals a highly favorable perception of the aesthetic value of the designs, with 90% of participants expressing agreement or strong agreement. This indicates that the proposed designs

are well-received in terms of aesthetics; however, a small minority (10%) remain unconvinced.

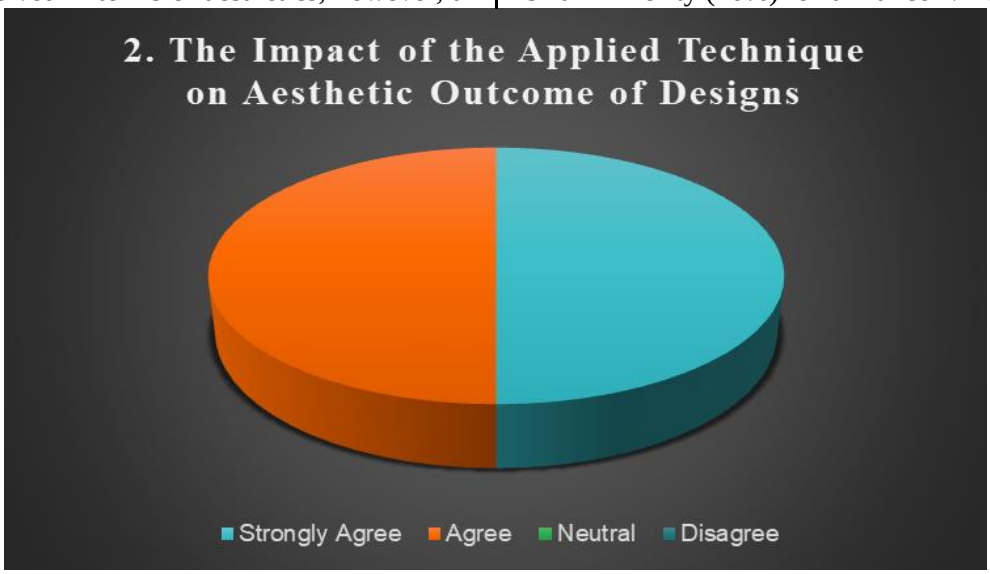

Figure 30. Responses of Consumers to Question Two

Figure (30) suggests a widespread harmony among participants regarding the technique's effectiveness in enhancing aesthetics. This reveals that the applied technique is regarded as beneficial for promoting the visual appeal of designs.

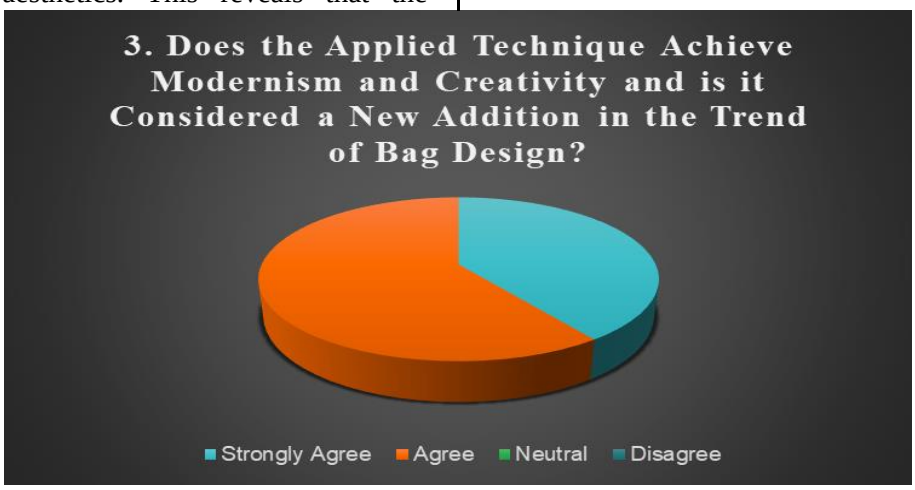

Figure 31. Responses of Consumers to Question Three

Figure (31) indicates that there is a consensus among the participants that the technique influences the innovation and evolution of bag design, symbolizing contemporary pioneering and aesthetics approaches.

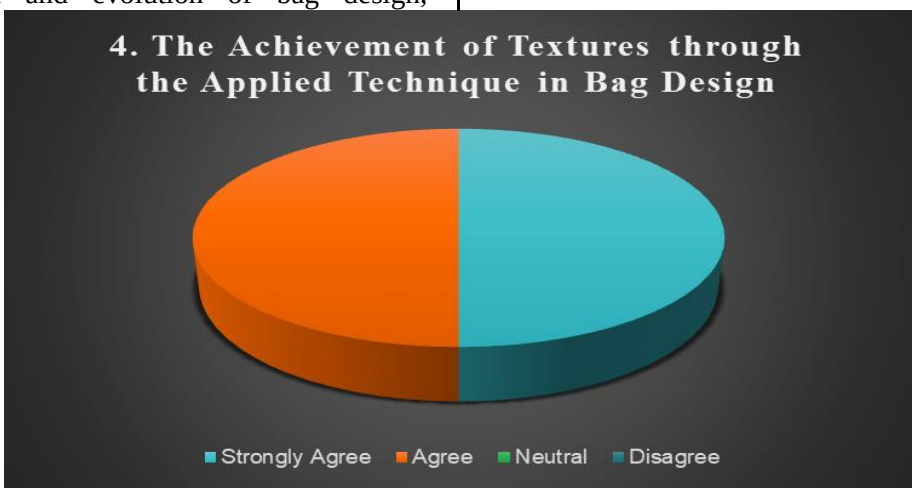

Figure 32. Responses of Consumers to Question Four

Figure (32) designates a unanimous consensus among participants regarding the technique's proficiency in texture creation. This is evidenced by the fact that 50% of respondents strongly agreeing and the other 50% agreeing that the applied technique achieves textures effectively in bag design,

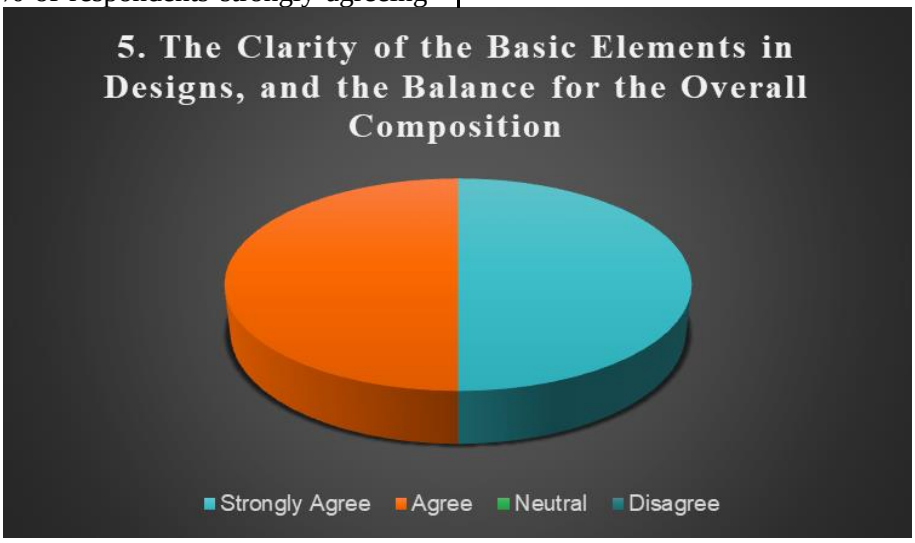

Figure 33. Responses of Consumers to Question Five

It can be noticed from Figure (33) that there is a consistent perception among respondents that the technique effectively enriches the clarity of essential design elements and fosters balance in the overall composition.

Functional Aspects

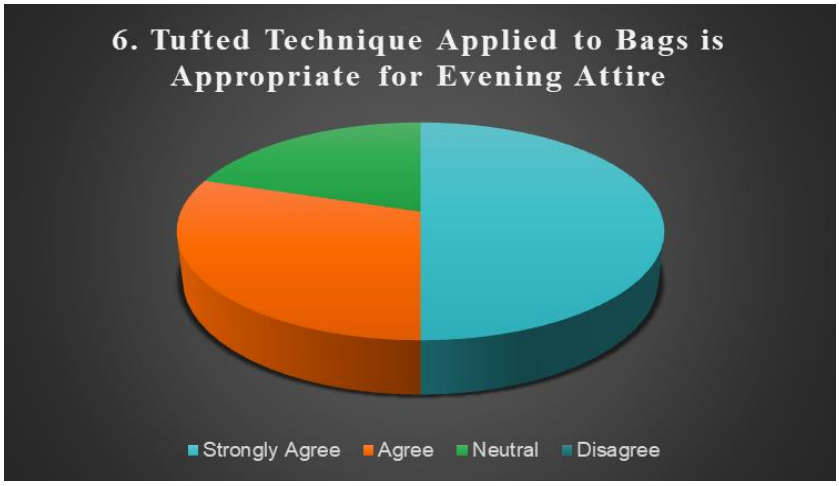

Figure 34. Responses of Consumers to Question Six

In general, while there is a considerable level of agreement concerning the relevance of the tufted technique for evening attire as illustrated in Figure (34), the presence of neutral responses suggests that some participants are undecided or have mixed feelings about whether the tufted technique is suitable for evening attire.

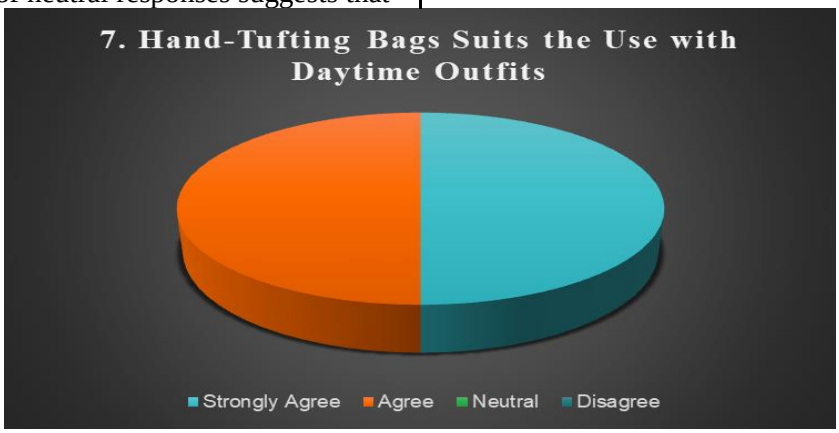

Figure 35. Responses of Consumers to Question Seven

Based on the responses depicted in Figure (35), it can be deduced that the majority of participants perceive hand-tufting as a fitting technique for creating bags that complement daytime wear. This deduction is supported by the fact that 50% of respondents totally agree, and the other 50% agree that hand-tufting bags suit the use with daytime outfits.

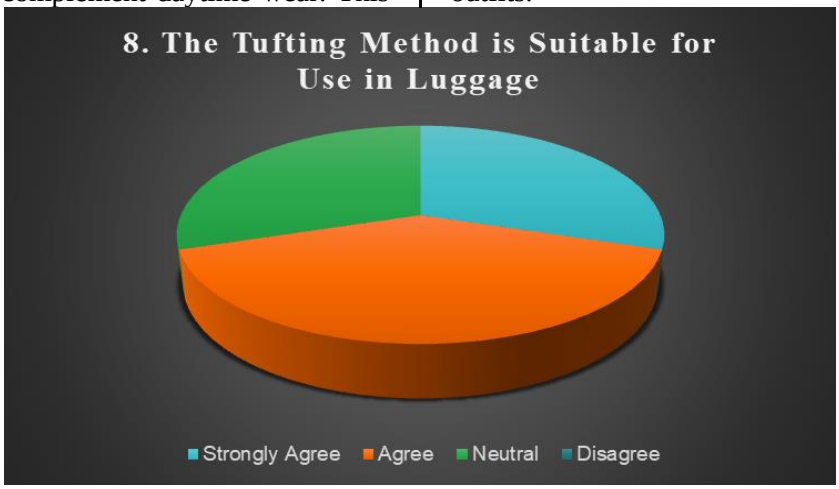

Figure 36. Responses of Consumers to Question Eight

Figure (36) suggests that there is predominant agreement (30% strongly agree + 40% agree) regarding the suitability of the tufting method for luggage. The presence of neutral responses (30%) indicates that some participants may have mixed feelings about whether the tufting method is suitable for luggage.

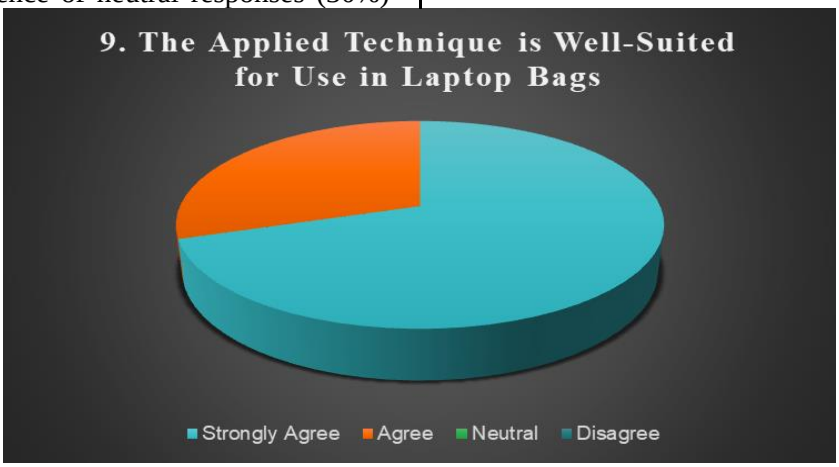

Figure 37. Responses of Consumers to Question Nine

The overwhelming agreement, with 70% of respondents strongly agreeing as demonstrated in Figure (37), indeed indicates a robust consensus among participants regarding the high suitability of the applied technique for use in laptop bags. The absence of neutral or disagreeing responses implies a high level of confidence amongst participants about the compatibility of the applied technique with laptop bags.

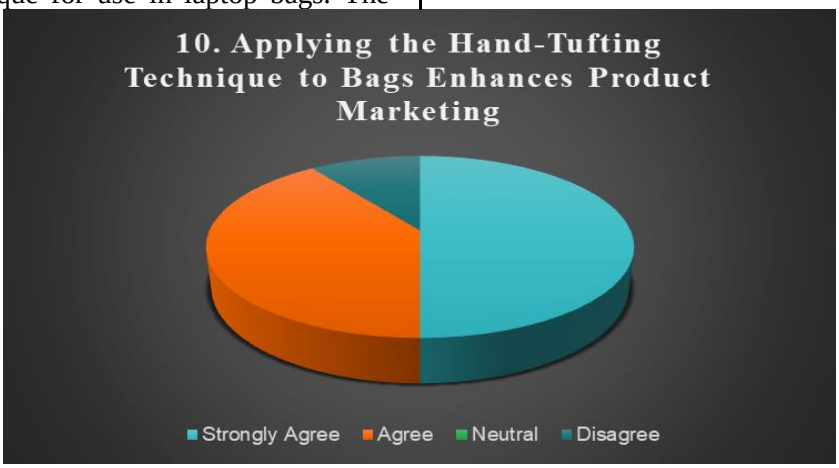

Figure 38. Responses of Consumers to Question Ten

It can be observed from Figure (38) that most participants perceive hand-tufting as a valuable asset in product marketing for bags, although there is some divergence in opinion, with a minority 10% expressing differing views or skepticism on the extent to which hand-tufting enhances product marketing.

B- Data Analysis of the Second Part of the Survey (Produced Samples)

Aesthetic Aspects

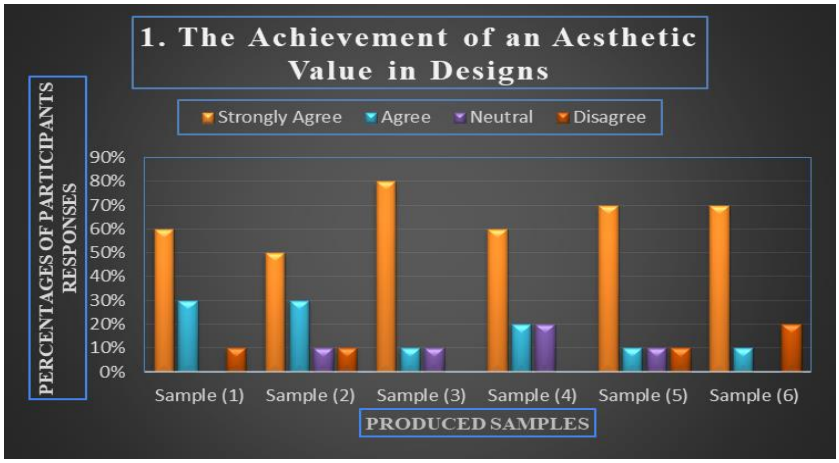

Figure 39. Responses of Consumers to Question One

Figure (39) indicates that there is a predominant agreement that the designs achieve aesthetic value across all Sample, with various levels of intensity. Over 60% strongly agreeing in Samples 1, 4, 5, and 6. The highest level of agreement was observed in Sample 3, with 80% strongly agreeing.

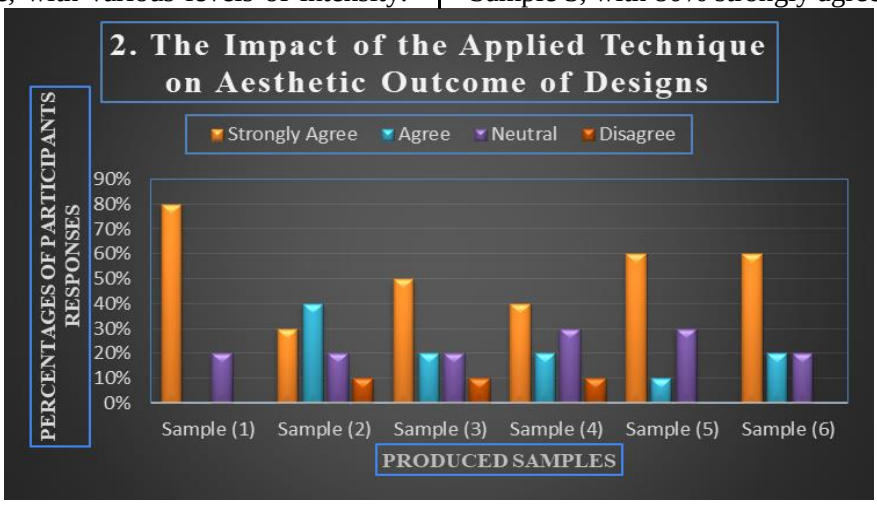

Figure 40. Responses of Consumers to Question Two

It can be deduced from responses pictured in Figure (40) that there's general agreement across most samples, while there are variations in the distribution and intensity of responses, signifying opposing perspectives on the aesthetic impact of the applied technique among participants.

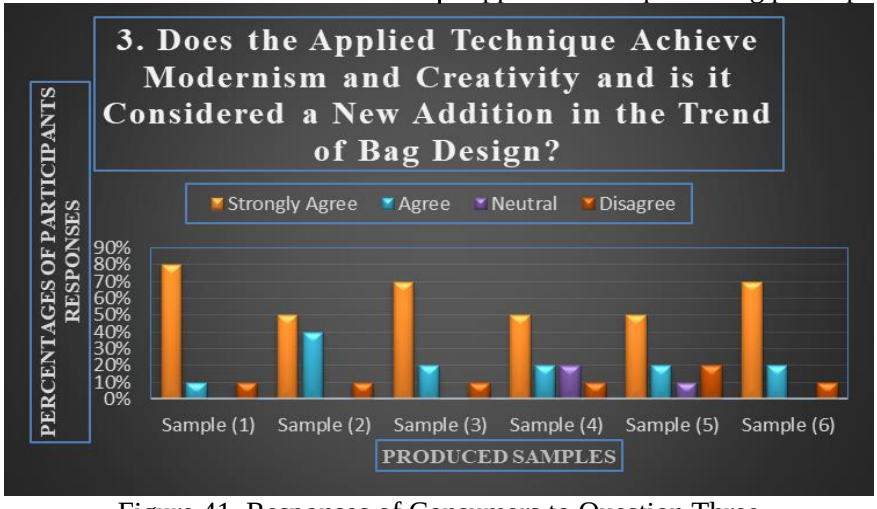

Figure 41. Responses of Consumers to Question Three

Results shown in Figure (41) designate positive perceptions across most samples regarding the achievement of modernism and creativity by the applied technique in bag design; while Samples 1, 3, and 6 show strong agreement among participants, with over 70% strongly agreeing, Sample 2 demonstrates a balance between strong agreement and agreement. However, Samples 4 and 5 exhibit a mix of agreement, neutrality, and disagreement, with no dominant response.

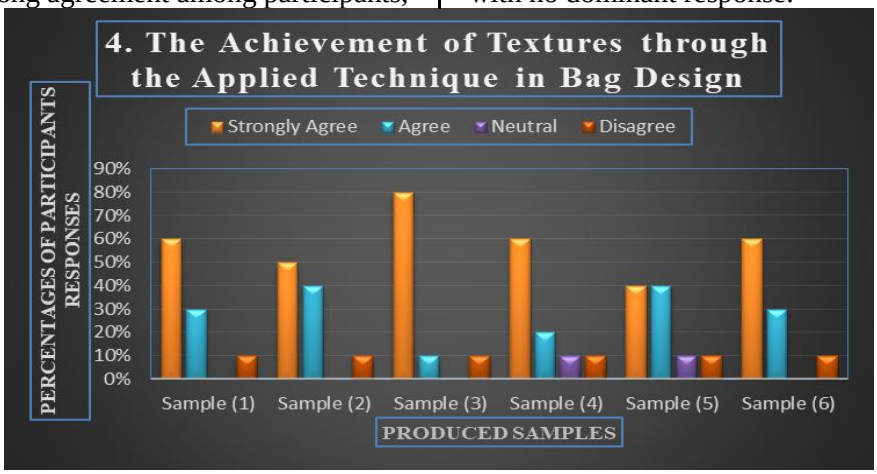

Figure 42. Responses of Consumers to Question Four

It can be summarized from Figure (42) that there is generally positive perceptions across most samples regarding the achievement of textures through the applied technique in bag design. This appears obviously in Samples 1, 2, 3, 4, and 6. On the other hand, Sample 5 exhibits a relatively balanced distribution between agreement and neutrality. Disagreement rates are consistent across samples, ranging from 10% to 20%.

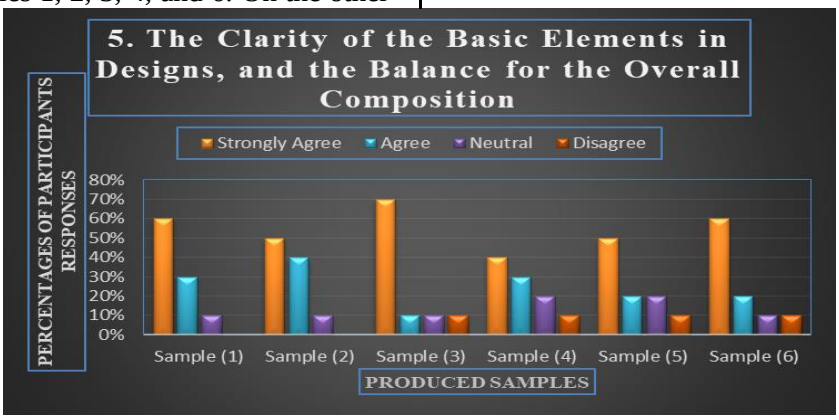

Figure 43. Responses of Consumers to Question Five

According to Figure (43), Samples 1, 2, 3, 5, and 6 demonstrate varied degrees of intensity and a predominant agreement among participants. This indicates that the basic elements' clarity and the overall composition's balance are positively perceived in these samples. On the other hand, Sample 4 shows a fairly balanced distribution of agreement, neutrality, and disagreement, suggesting that participants had differing perspectives about these features of the designs.

Functional Aspects

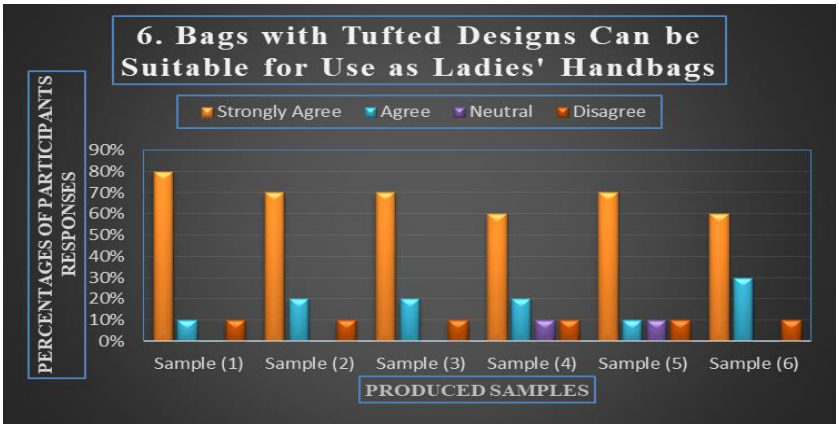

Figure 44. Responses of Consumers to Question Six

Figure (44) addresses the suitability of bags with tufted designs for use as ladies' handbags. Samples 1, 2, 3, 5, and 6 exhibit strong consensus, with most participants either strongly agreeing or agreeing. In contrast, Sample 4 presents a more nuanced response, with a balanced distribution between agreement, neutrality, and disagreement.

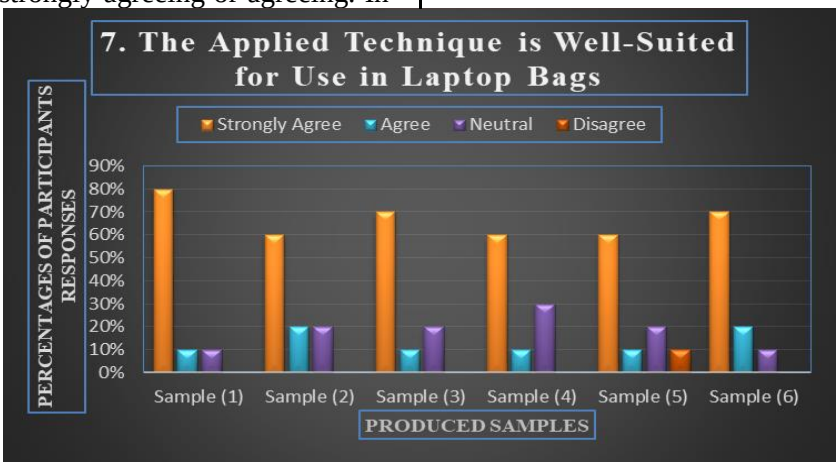

Figure 45. Responses of Consumers to Question Seven

It can be observed from Figure (45) that there is robust agreement across all Sample, indicating a strong positive perception of the applied technique's suitability for laptop bags. The majority of participants across most samples either strongly agree or agree. However, neutral responses are present in all Sample, and disagreement is very low, with only Sample 5 showing a 10% disagreement rate, indicating minimal opposition to the technique's suitability.

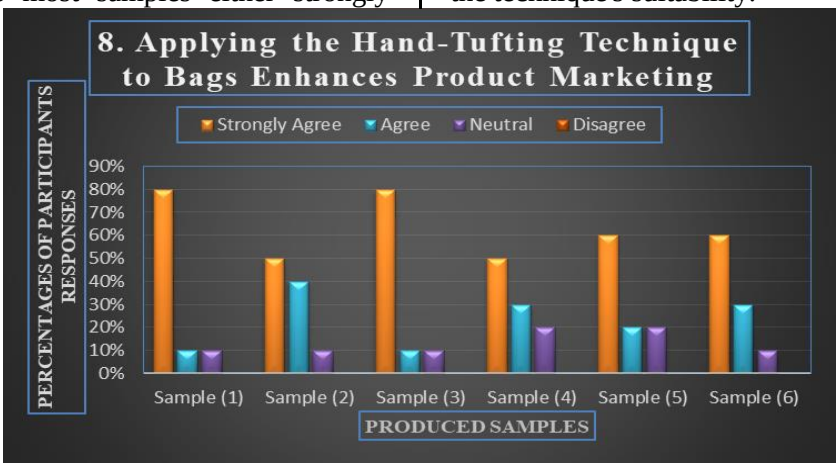

Figure 46. Responses of Consumers to Question Eight

The findings from Figure (46) indicate a unanimous consensus that using the hand-tufting technique on bags improves their marketing. This statement is largely agreed upon or highly agreed upon by participants in all Sample, indicating that hand-tufting is regarded as a benefit for promotional purposes. The total lack of disagreement across all Sample demonstrates that hand-tufting has no perceived detrimental effects on product promotion.

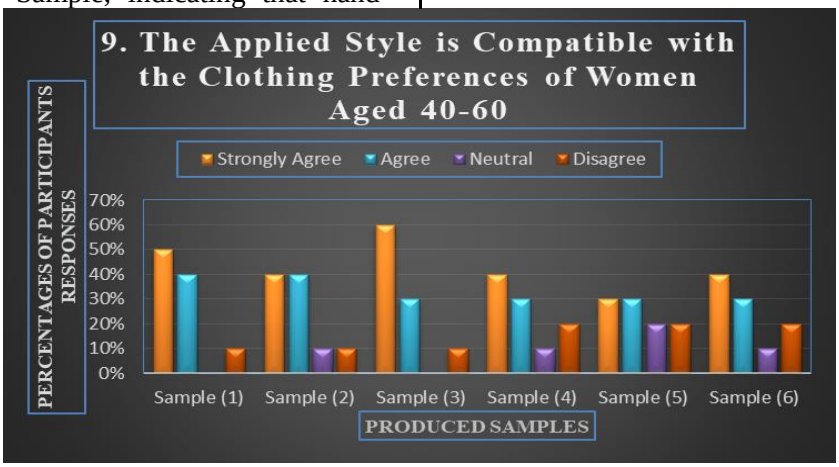

Figure 47. Responses of Consumers to Question Nine

The overall results presented in Figure (47) show that women between the ages of 40 and 60 generally have a positive opinion of how well the applied style complements their personal style choices. The strength of this sentiment varies between high compatibility, as shown in Samples 1 and 3, moderate compatibility in Samples 2, 4, 5, and 6, and contrasting views in Samples 4, 5, and 6, which exhibit more varied responses.

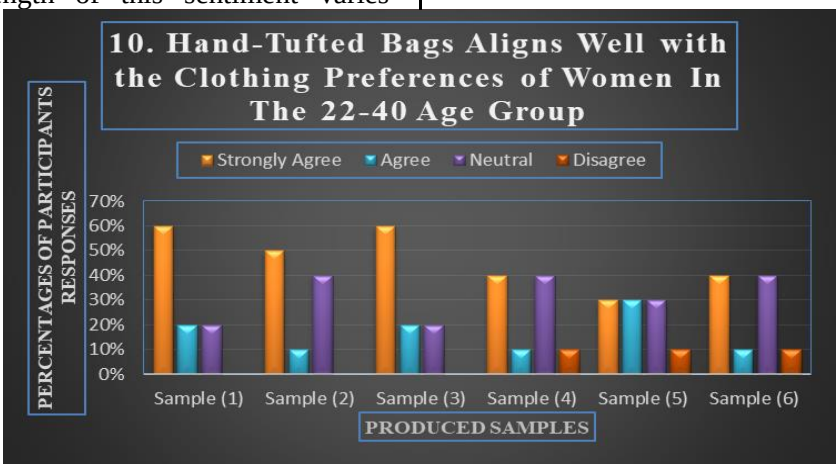

Figure 48. Responses of Consumers to Question Ten

It can be observed from Figure (48) that there is a positive perception that hand-tufted bags align well with the clothing preferences of women in the 22-40 age group. The intensity of this perception varies, ranging from high compatibility to moderate compatibility, uncertainty, and contrasting views, as presented in the previous chart. These variations signify that participants' levels of assurance and acceptance differ.

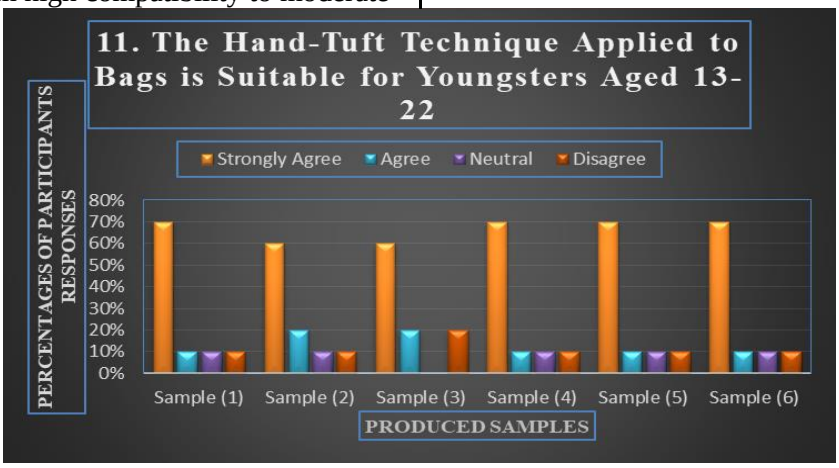

Figure 49. Responses of Consumers to Question Eleven

The overall results depicted in Figure (49) indicate a strong positive perception that the hand-tuft technique is suitable for youngsters aged 13-22. The strength of this perception varies, with high compatibility in Samples 1, 4, 5, and 6, moderate compatibility in Samples 2 and 3, and some uncertainty and mixed views, particularly in Sample 3.

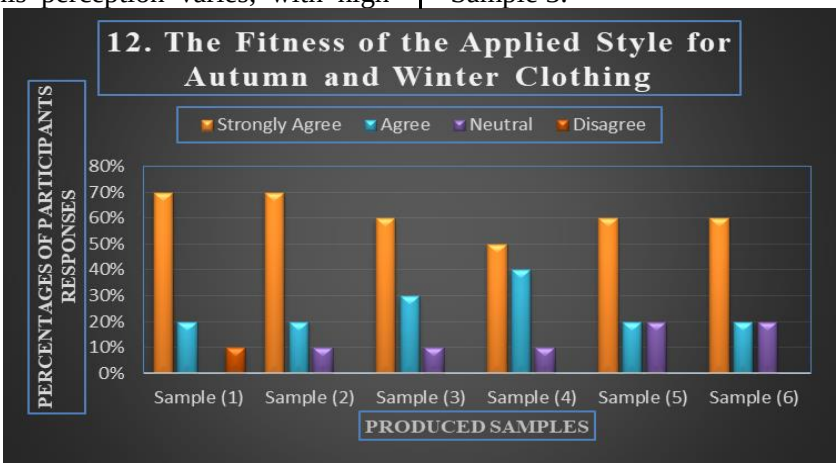

Figure 50. Responses of Consumers to Question Twelve

The overall results from Figure (50) indicate a strong positive perception that the applied style is well-suited for autumn and winter clothing. The strength of this perception varies, with high compatibility in Samples 1 and 2, moderate compatibility in Samples 3, 5, and 6, a balanced perception in Sample 4, uncertainty in several samples (2, 3, 4, 5, and 6), and minimal disagreement only in Sample 1.

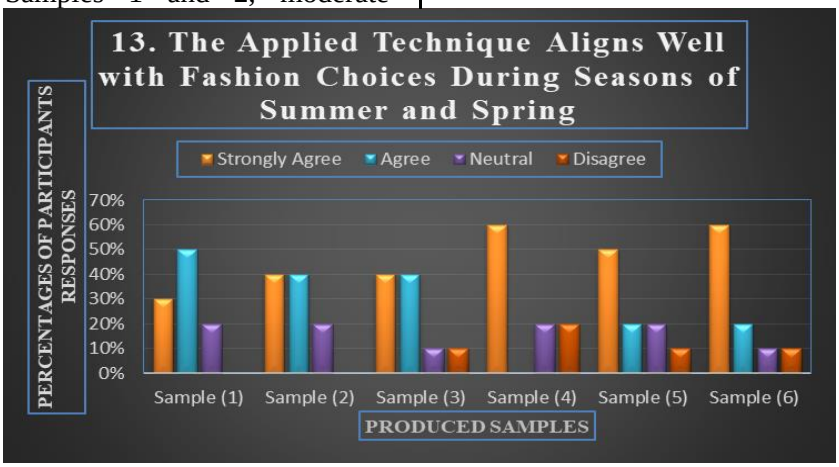

Figure 51. Responses of Consumers to Question Thirteen

As illustrated in Figure (51), there is a positive perception that the applied technique aligns well with fashion choices during the seasons of summer and spring. However, the strength of this perception varies, with strong agreement in Samples 4, 5, and 6, agreement in Samples 1, 2, and 3, neutral responses across all samples, and minimal disagreement in Samples 3 and 4.

Conclusion:

The data analysis from multiple samples shows that the applied technique is generally well-received across numerous elements of bag design. Most participants concur that the method accomplishes aesthetic value, improves product marketing, and fits in effectively with seasonal fashion choices. Overall, there is a positive consensus, despite some differences in the degree of agreement and some ambiguity shown in the neutral responses. Minimal disagreement indicates that the hand-tufted technique is widely regarded as beneficial, with only a few instances of dissent. These results demonstrate the effectiveness and versatility of the applied technique in enhancing various aspects of bag design and marketing. Moreover, the utilization of natural materials in the samples emphasizes how critical it is to embrace sustainability in future endeavors, aligning with consumer demands for eco-friendly products and manufacturing techniques.

Recommendations:

- Directing designers and manufacturers to pay attention to small trends in designing the smallest products in cooperation with the department of environmental affairs.
- Urging textile designers to manufacture sustainable products using local materials by holding workshops and competitions.

References:

1- L. Ribeiro, R. Miguel, M. Pereira, J. Lucas, and I. Trindade, “Evolution of fashion accessories: bags design and the use of woven fabrics,” Glob. Fash. 2012, pp. 12–26, 2020.
2- Mahmoud, “The design possibilities of Hand tuft carpets in expressing the aesthetic values of fine arts (practical models),” vol. 6, no. 4, pp. 5055–5073, 2022.
3- N. Tarafder, “Interior Design and Interior Decoration with Textiles,” Journals Mechatronics Mach. Des. Manuf., vol. 1, no. 2, pp. 5–14, 2019, [Online]. Available: https://www.academia.edu/90668489/Interior_Design_and_Interior_Decoration_with_Textiles
4- A. Persson, Exploring textiles as materials for interaction design, no. 4. 2013. [Online]. Available: http://bada.hb.se:80/handle/2320/12221
5- “Hand Tufted Textures • Innovative Carpets Hand Tufted Textures • Innovative Carpets.” [Online]. Available: https://www.innovativecarpets.com/textures/
6- M. Bera, “Study on Tuft Withdrawal Force and Compressibility of Hand-Tufted Carpet,” J. Inst. Eng. Ser. E, vol. 100, no. 2, pp. 175–181, 2019, doi: 10.1007/s40034-019-00151-3.
7- “Hand Tufting Gun AK.pdf.” [Online]. Available: https://ohmytuft.com/product/hand-tufting-gun-ak-i-cut-pile/
8- L. E. Richter, A. Carlos, and D. M. Beber, “Challenging the Conventions of Industrial Tufting Methods in the Field of Contemporary Couture”.
9- P. A. Rodgers and C. Bremner, “The Concept of the Design Discipline,” Dialectic, vol. I(1),.,

2017, doi: 10.3998/dialectic.14932326.0001.104.
10- A. Kamisa, A. Abu Hasan, G. Hustvedt, R. Jamaluddin, M. F. Na'am, and N. Zakaria, "Women's Handbag Innovation: Design, Comfort, and Safety Features," Int. J. Innov. Creat. Chang., vol. 11, no. 10, pp. 711–726, 2020.
11- C. Abeykoon, A. McMillan, C. H. Dasanayaka, X. Huang, and P. Xu, "Remanufacturing Using End-of-Life Vehicles and Electrical and Electronic Equipment Polymer Recyclates - a Paradigm for Assessing the Value Proposition," Int. J. Light. Mater. Manuf., vol. 4, no. 4, pp. 434–448, 2021, doi: 10.1016/j.ijlmm.2021.06.005.
12- M. E. Ramadan, "The Impact of Applying Green Technology on Architecture and Interior Design to Achieve Environmental Balance," vol. 9, 2023, doi: 10.21608/MJAF.2023.190943.3005.
13- W. E. E. Z. A. Aboganema and S. N. E.-D. M. El-Saadany, Nada Osama El-Sayed Ahmed, Mustafa, "Sustainability in Product Design and using it for designing organic food containers containers," Archit. Arts Humanist. Sci., vol. 0, no. 0, pp. 0–0, 2021, doi: 10.21608/mjaf.2021.73295.2329.
14- R. Blackburn, "Sustainable Apparel: Production, Processing and Recycling," Sustainable Apparel: Production, Processing and Recycling. pp. 1–268, 2015. doi: 10.1016/C2014-0-02597-X.
15- H. Tawfik Halim, Y. Tawfik Halim, and S. Adly El Sheikh, MSA-Management science journal ISSN 2974-3036 Volume: 1, Issue:1, Year: 2022, no. 1. 2022.