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## Innovative Techniques for Production of Terry Towel Fabrics with Aesthetical Values

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## Innovative Techniques for Production of Terry Towel Fabrics with Aesthetical Values

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### Abstract:

Terry fabric is such an important type of fabric that it has taken a very essential place in the daily live. However, the current methods used for the production of terry fabrics are considered as conventional techniques, and the produced fabrics have a classical appearance. The improvement in living standards requires enhancement of the aesthetic characteristics of terry fabric as equal as its functional properties. This consequently demands looking for innovative techniques in designing of terry fabrics that achieve novel aesthetical values. This in turn enriches the surface appearance of this type of fabric, and, hence, it can compete other fabrics in local and international markets resulting in increase in exports of this sector. This research concerns with designing innovative techniques for production of terry towel that enrich the aesthetical value of the fabric. Two innovative techniques have been developed in this research. The first one is the designing of textured terry, and the other is the designing of stripped terry. The produced samples were evaluated by a questionnaire, and data were collected and analyzed to assess participants' opinion on the innovative fabrics. The results of the questionnaire showed that the samples produced by the innovative techniques have accomplished novel vision of terry fabrics with aesthetical value which is different from the traditional towels.

### Keywords:

*Terry Fabrics  
Innovative Techniques  
Textured Terry  
Stripped Terry  
Aesthetical Values.*

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### Introduction

Terry fabrics are among the most frequently used textile items in the world. [1] This type of fabric is made with loop piles -that are formed by certain warp ends- on one or both sides generally covering the entire surface. [2] The fabric consists of one series of weft thread and two series of warp threads, the ground and the pile. [3]

Fashion, style, color and pattern are of the requirements for terry towels, [4] and raising the level of aesthetic features of terry products becomes a necessity. [5] Hence, the terry fabric design has gained equal importance as that of its functionality. With taking into consideration the elements and principles of design, an innovative vision of terry fabric design can be obtained.

### Research Problem

The current methods used for the production of terry fabrics are considered as conventional techniques, and the produced fabrics have a classical appearance, and this may influence its ability to compete other fabrics in the markets.

### Research Importance

Enriching the aesthetic characteristics of terry fabrics by using novel visions in the fabric design in order to compete other fabrics in local and international markets.

### Research objectives

Designing of two innovative techniques for production of terry fabrics to accomplish aesthetical values, and obtaining novel vision in terry towel design that is different from the current traditional view of terry products on the markets.

### Theoretical Framework

#### *Elements and Principles of Design*

Elements that are arranged, specifically in a decorative manner, to create effects can be defined as designing. [6],[7] The elements of designs are the components that designers can make use of to create an art form. [8], [6] The guides that govern how elements are combined together can be defined as the principles of design. [9]

#### *Design Elements*

##### **Dot**

Dot is the basic element of point. It is the smallest unit indicating its presence and position. Dots

combined and arranged towards one sideways indicate direction. A chain of points become a line. [9]

### **Line**

Line is the path of a point moving through space. It indicates the shape and size of an object. It helps to express emotions and attitudes. [7] As the line moves, it designates direction. [6]

### **Shape:**

The shape is two-dimensional object made by lines. [8] It is created when the line turns and meets up with its start point. [6] The shape can be classified into two categories, geometric shapes and organic shapes.

### **Form**

The form is a three-dimensional shape that has width, height and depth. [8] There are numerous means that can be used to give an illusion of three-dimensional form. Line, shape, value, color and texture can all be used to suggest form. [6] Moreover, space is a strong element in establishing a sense of form. This is because the space between and around objects helps in recognizing and identifying three-dimensional forms. [10]

### **Space**

Space is an area where objects, either a shape or form occupy. It can also be empty, referring to the background against what is seen, shape or form. [8]

### **Value (Tone)**

Between the whitest white and the blackest black there are countless degrees of light and dark values. Value can be defined as the intensity of white in the color; also known as brightness and luminance, referring to dark and light. [6], [10]

### **Texture**

Texture is the surface of a material when it is touched. [11] In textiles, the word 'texture' points to the nature of fabric surface. Smooth, rough, hard, dull, glossy, silky, hairy, leathery, sandy or bumpy, etc. are different types of feel, and each nature of texture has its own effect. [7]

### **Color**

Color is made of light and depends on it. Light must exist in order to see color. Color can be represented with the words hue, intensity and value.

- Hue is the "color" of a color, or the name of the color; red, yellow, green, etc.
- Intensity refers to the color strength or its saturation, i.e. the brightness or dullness of a hue.
- Value tells the amount of lightness or darkness of a hue. [6], [11]

### **Design Principles**

### **Balance**

Balance is a feeling of stability. It refers to the elements distribution in an art work. It is also the visual equilibrium of elements that causes the total design image to appear balanced. [10]

### **Repetition and Pattern**

Repetition occurs when elements that have something in common are repeated. Repeated shapes make patterns. [6] Pattern increases visual excitement by enhancing surface interest. [10]

### **Emphasis (Focal Point)**

Emphasis creates dominance and calls attention to important areas of design and subdues everything else on the work of art. By placing emphasis on certain areas, centers of interest can be created, and that cause the eyes to return there again and again. [6], [10]

### **Contrast**

Contrast refers to differences between the elements of the design. It creates visual excitement and adds interest to the artwork. [6], [10] Elements that contrast strongly stand in opposition to each other. [6]

### **Rhythm**

Rhythm is the repetition of visual elements; colors, shapes or lines. [10] It allows the eye to move from one part of a design to another part. [11] However, variety is vital to keep rhythms exciting and active, and to avoid monotony. [10]

### **Movement**

The illusion of movement can be created by careful arrangement of the design elements. In optical art and designs, the sensation of movement may deeply influence the viewer's responses. Some paintings can provoke dizziness by making it difficult for the eyes to focus on a central point. [6]

### **Proportion**

Proportion refers to the relationship between one part of a design and another part or to the whole design. It is a comparison of sizes, shapes, and quantities. [11]

### **Experimental Work**

This research aims to achieve novel vision in terry towel design which is different from the current traditional view of terry products on the markets. Two innovative techniques were developed in designing of terry towels (textured terry fabrics and stripped terry), then the produced fabrics were evaluated by a questionnaire filled by textile experts to assess their opinion on the innovative fabrics.

### **The Parameters used for Producing Samples under Study**

In this research, three fabrics were produced according to specification in tables (1), (2) and (3).

All fabrics have the same weave structure and the same pile height, but differ from each other in the innovative technique used for designing the fabrics.

#### ***The First Innovative Technique (Textured Terry Fabrics)***

The design of terry fabrics in this innovative technique is similar to the conventional terry towel except that every colored area in the terry pile design has a textural design which is different from the other areas. The design of textured terry fabrics can be seen in designs (1) and (2) in figures (1) and (2).



Figure (1) Design (1)



Figure (2) Design (2)

#### ***The Second Innovative Technique (Stripped Terry Fabrics)***

In this innovative technique, stripes in terry fabrics are produced by the terry weave structure. The stripped design of terry fabrics is produced by

three colors, two colored warp pile threads (face pile threads and back pile threads), and the third color is resulted from combining the two warp colored threads together. Stripped terry fabrics can be shown in designs (3) and (4) in figures (3) and (4).



Figure (3) Design (3)



Figure (4) Design (4)

#### ***Specifications (Machine and Fabrics)***

##### ***Specifications of the Machine Used in Producing the Samples***

The production of terry towel fabrics was implemented in Nile Textile Industries Company in Kafr Hakim, Kirdasa. The specifications of the loom used for producing the terry fabrics are shown in table (1).

**Table (1) Specifications of the Loom Used in Producing the Samples under Study in Textile Workshop**

N o.	Item	Specifications in Nile Textile Industries Company
1	Loom Type	SMIT
2	Loom Model	GS900F
3	Manufacturing Country	Italy
4	Manufacturing Year	2008
5	Machine Width (Reed Width)	260
6	Machine Speed	350 Picks/ Min.
7	Weft Insertion Method	Rapier
8	Weft Selector	8 Fingers
9	Reed Used (Dents/ cm)	11.2 Dents/ cm
10	Denting	2 Ends/ Dent
11	No. of Colors of Pile Threads	2
12	Warp Threads Arrangement	2 Pile Yarns: 2 Ground Yarns

#### ***Specifications of the Jacquard Used in the Producing Samples***

**Table (2) Specifications of the Jacquard Used in Producing the Samples under Study in Textile Design Center and in Nile Textile Industries Company**

No.	Item	Specifications in Nile Textile Industries Company
1	Jacquard Model	STUBLI

The specifications of the jacquard used for producing the terry fabrics are shown in table (2).



2	Number of Hooks	6144
3	Design Hooks	1216
4	No. of Repeats	2
5	Repeat Width	101 cm

### Basic Specifications of the Produced Samples

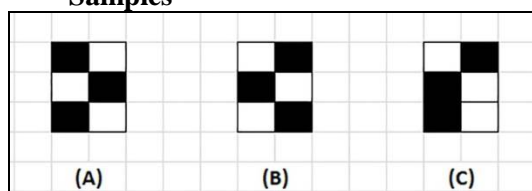
The basic specifications of the produced samples

are represented in table (3).

**Table (3) Basic Specifications of the Produced Samples**

No.	Property	Specifications in Nile Textile Industries Company
1	Warp Yarn Material	Cotton
2	Weft Yarn Material	Cotton
3	Count of Warp Yarns	24/2
4	Count of Weft Yarns	16/1
5	Warp Sett (Ends/ cm)	22.4
6	Weft Sett Picks/ cm)	22

### Weave Structures Used for the Produced Samples



**Figure (5) Weave Structures Used for Produced samples**

Figure (5) indicates three- pick terry weave structures used for the produced samples, where;

- 1- Weave Structure (A) represents the formation of pile loops for the first color on the face side of the cloth while the second color

appears in this area on the back side of the cloth.

- 2- Weave Structure (B) depicts the formation of pile loops for the second color on the face side of the cloth while first color appears in this area on the back side of the cloth.
- 3- Weave Structure (C) illustrates the weave Structure of the ground cloth.

### Story Board of the Produced Samples

Figures (6), (7) and (8) depict the produced samples of Designs (1), (2) and (4) where; figures (6) and (7) are for the first innovative technique, and figure (8) is for the second.



Figure (6) Produced Sample (1)



Figure (7) Produced Sample (2)



Figure (8) Produced Sample (3)

### Story Board of Produced Sample (1)

This design is composed of the following elements

that are illustrated in figures (9) and (10);



Figure (9) The Floral Motif Used in the Background of Design (1)

1. The floral motive in this design is mirrored horizontally. This mirror overlapped with the first motive and slide halfway down, in a lengthways direction creating a half drop repeat.
2. A foreground design of curved line and



Figure (10) The Foreground Shape of Design (1)

- horizontal lines is shaped over the floral design that is at the background.
3. A various textures are used in every colored area in the design as seen in figures (11), (12) and (13).

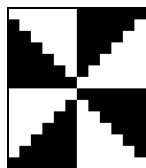


Figure (11) A Diamond Weave Used in the Floral Motif of Design (1)

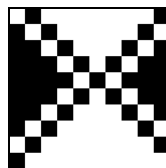


Figure (12) A Honeycomb Weave Used in the Curved Line of Design (1)

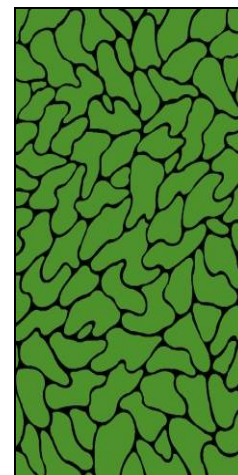


Figure (13) An Organic (curvilinear) Shape Used in the Background of Design (1)

#### Story Board of the Produced Sample (2)

The design of the produced sample consists of two designs as seen in figures (14) and (15); a floral

design combined with a curvilinear shape which is at the forefront of the design.



Figure (14) The Floral Ornament of Design (2)  
By observing figure (16) it can be seen that some elements were eliminated in the floral design and



Figure (15) The Curvilinear Shape of Design  
some were added such as the leaves.  
The curved lines in the organic shape as seen in

figure (16) were interlaced with each other like the plain weave structure.



Figure (16) The Floral Ornament of Design (2) after Amendment

A various textures were used in every colored area in the design as shown in figures (18), (19), (20)

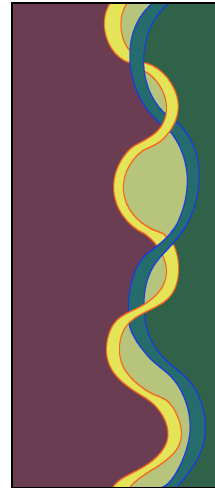


Figure (17) The Organic Shape of Design (2) after Amendment and (21).



Figure (18) A Diamond Weave Used in the Leaves of Design (2)

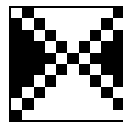


Figure (19) Honeycomb Weave Used in the Flowers of Design (2)



Figure (20) Circles Used in the Curved lines of Design (2)

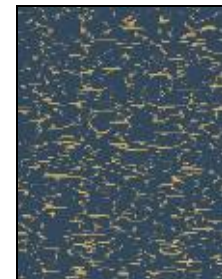


Figure (21) A Texture used in the Background of Design (2)

#### Story Board of the Produced Sample (3)

1. The design consists of a tree leaves with different sizes as seen in figure (22).



Figure (22) The Reference Idea of Design (4)

3. Some elements are excluded from the reference idea, and others are added.
4. The innovative design is duplicated with light value beneath the dark value.
5. Stripes are obtained in the design by



Figure (23) The Innovative Design (4) weave structures.

#### Collection and Analysis of Data

A questionnaire was employed as qualitative methodology, and the survey participants were classified into two categories according to their



specialization. On one hand there was a group of experts specialized in textile industry, whereas the second group were academic staff-members who were experts in textile design. After collection of data, analysis was done.

The questionnaire consisted of five questions as follows;

1. Does the innovative technique achieve an aesthetical value in design?
2. Does the innovative technique achieve creativity and modernism?
3. The influence of the innovative technique in creating an aesthetical effect in design.
4. Does the innovative technique increase the product marketing?

## Results and Discussions

### Technical Analysis of the Implemented Designs

#### Technical Analysis of the Produced Sample (1)

1. The curved line in the design conveys more feeling or more relaxing movement.
2. The horizontal lines create tranquil, calm, and balanced atmosphere.
3. An illusion of space is created through overlapping the floral motif with the horizontal lines that are at the forefront of the space.
4. The contrast of smooth curved line against rough horizontal lines creates visual excitement and adds interest to the artwork.
5. Contrasting of dark colors against light colors leads the design to stand out.
6. Textures that have a similar feel in every colored area convey the sense of unity, and add harmony to the design.

#### Technical Analysis of the Produced Sample (2)

1. The contrast in colors makes the floral ornament and the curved lines a focal point (point of emphasis).
2. The overlapping between the floral ornaments with the curved lines that are at the forefront of the design creates an illusion of space.
3. The use of curved lines achieves a sense of tranquil.
4. The texture used in the background of the design gives an impression of a regular rhythm.
5. A concept of positive and negative shapes is accomplished in the design through utilizing color contrast.

#### Technical Analysis of the Produced Sample (3)

1. The repetition of leaves creates rhythm and unity.
2. The use of value contrasts gives a feeling of space.
3. Using light value beneath the dark value creates a sense of shallow depth.

4. The variance of stripes' thickness (width) creates an irregular rhythm.

### Data Analysis of the Questionnaire

#### The Achieve of Aesthetical Value in Design

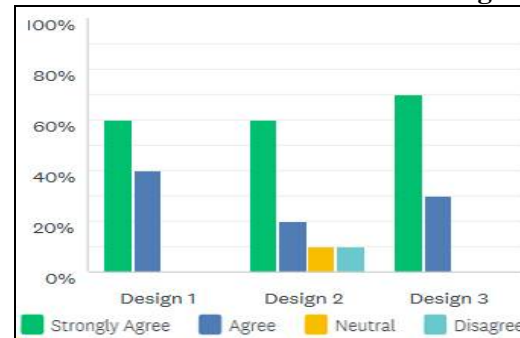


Figure (24) The Achieve of Aesthetical Value in Design

Figure (24) shows that nearly 65% of people were strongly agree with the statement that the innovative techniques used in the production of terry towels achieved an aesthetical value in designs (1), (2) and (3) whereas 10% of them declined the statement in design (2).

#### The Achievement of Creativity and Modernism

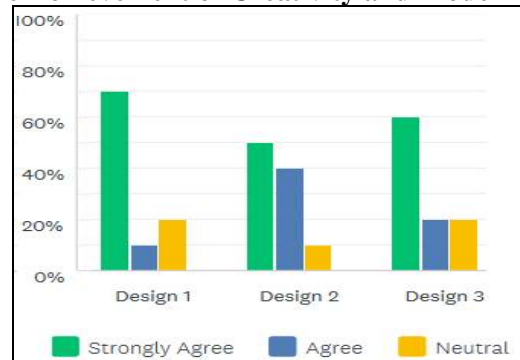


Figure (25) The Achievement of Creativity and Modernism

Figure (25) indicates that 70% of people thought that the innovative techniques achieved creativity and modernism in design (1) whereas about 55% were strongly agree with the statement in design (2) and design (3). Conversely, about 15% of participants thought that the innovative techniques achieved creativity and modernism in all produced designs.

#### The Impact of the Innovative Techniques in Creating an Aesthetical Effect in Design

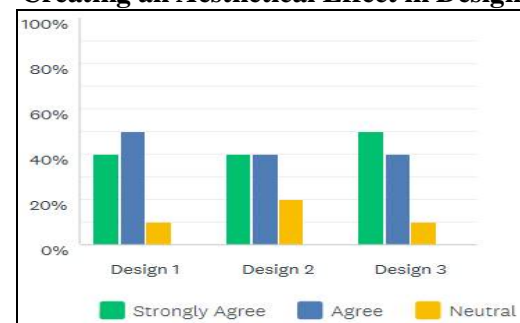


Figure (26) The Influence of the Innovative



### Technique in Creating an Aesthetical Effect in Design

Figure (26) illustrates that about half of participants were agreed with the statement that the innovative techniques have an influence in creating an aesthetical effect in designs (1), (2) and (3) whereas nearly 15% of people contended that the innovative technique did not have an essential influence in creating an aesthetical effect in the produced designs.

### The Increase in the Product Marketing

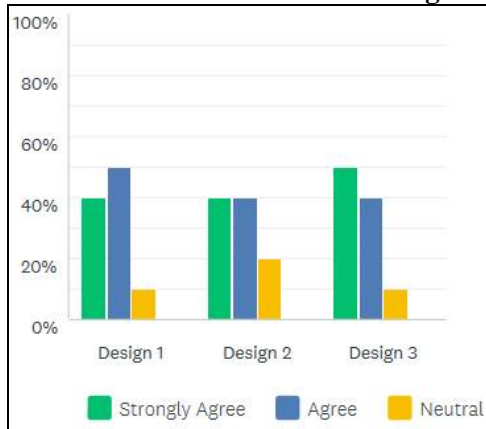


Figure (27) The Increase in the Product Marketing

Figure (27) illustrates that about 45% of participants thought that the innovative techniques increase the product marketing in designs (1), (2) and (3), whereas nearly 15% of people were roughly agreed with the statement that the innovative techniques increase the product marketing in the produced samples.

### Conclusions

The present work was developed to produce terry towel fabrics with aesthetical values by using innovative techniques. Two innovative techniques were employed in this research. The first one is to produce textured terry fabrics that have various designs in every colored area, and the other one is to create stripped terry fabrics by using terry weave structures.

After collecting data, analyzing results of the questionnaire, it can be concluded that the vast majority of textile experts who filled the questionnaire believed that;

1. An aesthetical value in the produced samples was achieved by using the two innovative techniques
2. Creativity and modernism was accomplished.
3. The two innovative technique had an

influence in creating an aesthetical effect in the produced designs.

4. The marketing of the produced samples was increased by using the two innovative technique.

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