

# Innovative Solutions for Traditional Saudi Arabian Costumes Using TRIZ Principles

Wafa H. Shafee and Laila A. Fedá

Department of Fashion & Textile Design, college of Art & Design, Princess Norah Bint Abdulrahman University,

E-mail: washafee@pnu.edu.sa; lafeda@pnu.edu.sa

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## Abstract

This research is about finding solutions to obstacles that limit using traditional women's costume in Saudi Arabia by adopting TRIZ principles, to design an innovative fashion collection which is commensurate women needs in the current era while reflecting a traditional legacy. Research tools consist of a questionnaire about contemporary women's clothes, a business matrix of contradictions, and principles of TRIZ theory. The research resulted in the ability to design a contemporary fashion collection focusing on the positive factors in traditional clothing by applying TRIZ principles 10/Preliminary Action, 15/Dynamization, and 35/ Parameter Changes, which helped in reducing production cost and time. In addition, solving the obstacles to the spread of traditional clothes, which include convenience and communication flow.

*Keywords:* TRIZ theory, Systematic innovation, Traditional clothes, Contemporary clothes.

## 1. Introduction

Human societies are essentially based on the customs and traditions that constitute their cultural heritage, of which habits are an important part. But, humans can adjust their habits as their environment evolves and develops. Some of fashion's heritage elements, for example, are now considered useless because they conflict with modern circumstances; therefore, adjustments became necessary to suit modern condition.

One effect of globalization has been a growing desire for women to follow international fashions, along with a constant quest for renewal. However, one of Saudi Arabia's Vision 2030 goals is to preserve Saudi Arabia's national identity through the preservation of the country's cultural heritage in traditional costumes. The theory of inventive problem solving, or Teoria resheniy izobretatelskikh'zadatch (TRIZ - the English acronym is TIPS) (Savransky, 2000) can be applied to help the country to meet this vision.

TRIZ is a methodology that can be used to develop creative thinking to find inventive solutions to

problem (Abu Jado, 2007). The Soviet scientist Genrich Altshuller and his colleagues developed the theory between 1946 and 1959. Altshuller discovered that behind all innovations and inventions, 40 design principles can be applied to solve any problem. The theory was published in 1969, and in 1989 he founded the Russian TRIZ Association (Altshuller, Clarke, Shulyak, & Lerner, 2005) and (Jiang, 2010). The patent of the examined documents reached more than three million (Barry, Domb, & Slocum, 2017).

TRIZ theory appeared in the Arab world in 2003 (Abu2 Jado & Nofal, 2017). Despite its discovery and original use in the fields of engineering and technology, TRIZ theory can also be applied in other disciplines, such as management, social relations, literature, and the arts. In Saudi Arabia, Alrafei (2008) tested some of the TRIZ principles of innovative solutions to problems on first year secondary students from the Asir region. Alrafei clearly concluded that the use of this theory leads to the development of problem-solving skills.

In this research TRIZ theory was chosen because it uses logic in solving problems within a limited tech-

nical scientific approach, and that is to choose a suitable solution within 40 principles which stops the occurrence or frequency of the problem, especially if it was resulted due to a component of issues as production, esthetical, or social without aligning to a specific solution.

The underlying problem in preserving long-established Saudi Arabian fashion is the lack of traditional-style designs in contemporary fashion ranges, despite a distinguished heritage of distinctive construction lines and colors, and decoration and ornamentation. Therefore, it is important to specify the underlying reasons causing this problem from a Saudi woman's perspective, in addition to analyzing them according to TRIZ principles. This should allow us to reach creative solutions that rely on logic to ensure the continuation of Saudi traditional fashion cultural heritage

## 2. Literature Review

Forming an idea or an innovative visualization for a new product is based upon inferred variables, including the consideration of a product, experience. Innovation and creativity are the openings for renewal in any field, and any type of work could be considered an innovation if it is intentional, out of routine, and offers a new generalized service (Tayeb, 2016).

Consumer's creative behavior depends on fashion trends that they make by coordinating existing fashion and determining what fits within that fashion style, and then buying new complementary products. Therefore, the unique and innovative fashion look styled by consumers can be a source of inspiration for manufacturers (Sproles, 1979). Creative thinking must be used to confront and solve the quantum problems that exist throughout the supply chain in apparel industry (Marcketti & Karpova, 2015). Fashion innovation begins with consumer's behavior towards dressing. Creative behavior in how clothes are used is linked to an individual's need for a certain product, and simply using an existing product in a new and novel way can be a source of innovation (Hirschman, 1984).

Thus, consumers can be highly creative and skilled in their ability to solve problems, and it is believed that alternative buying behavior can generate new ideas (Price & Ridgway, 1982). Consumer satisfaction helps with building a long-term relationship between marketers and customers, which in turn helps the process of product diffusion, especially for visual products such as fashion. And, celebrities' use of fashion also affects the consumer's clothing behavior and purchasing of new products (Shukre & Dugar, 2013).

There are some developmental studies concerned with consumer needs and desires towards traditional fashion. One such study is Al-Aboudi (2008) which examined a range of Saudi men's clothing designed to fit the needs of contemporary youth by determining young people's opinion in developing the Saudi "Thobe," a traditional costume for men to limit the reasons young people give to prevent them wearing it. Fairak (2013) also provided a development study that sought to identify the desire of brides to wear traditional dresses, and the possibility of integrating traditional hand embroidery with contemporary designs. Fairak's research suggests that combining the old with the new can be one method for keeping cultural heritage alive.

The creative industries develop and make new works of art, which can then be used by the manufacturing and service sectors. For example, similar versions of new innovative pieces can be mass-produced for the mainstream market. This also applies to the fashion industry, where innovative collections are copied and adapted to create clothes for well-known everyday brands (Age, 2008).

Innovations can also be nurtured and developed by adopting a problem-solving approach. These problems can be real or invented if there is a need to find strong and stable solutions to produce innovative and creative designs (Stacey, Eckert, & Wiley, 2002). Multimedia design programs can also be effective in developing fashion design skills (Al-Nail, 2007). (Chin-Min, Wang & Ying-Li, 2015) applied eight of the 40 TRIZ principles (numbers 12- 15- 23- 25- 29- 32- 33- 34) to design customized fashion handbags, which is an interesting development in finding new business opportunities in fashion. After using TRIZ, Benetton Inc. adopted principle 10 to solve cost and time production problems to ensure that fashion is presented on time. Moreover, Benetton Inc. considered using TRIZ as an effective strategy to solve other business problems (Mann, 2002). Any technical system tends to reduce costs, and any technical system through its duration tends to become more ideal (Jiang, 2010). The study of traditional costumes and accessories has also inspired creative new designs. One group of scholars have documented the distinctive features of traditional Saudi fashions, such as shape, lines, decorations, colors, fabrics, and implementation (Ashour, 1995) (Yamani, 1997); (Al-Hulayel, 2007); (Al-Suwaida, 2007). Yet, their work has not broadened the spread of their designs in Saudi society regardless of its uniqueness.

Thus, it is important to try to adopt TRIZ principles because they rely on logic and data, and could help in traditional fashion. Furthermore, these principles can be applied to a range of traditional costumes.

From this discussion of the literature, the importance of recognizing another category of women has become evident because women shape consumer's opinions toward traditional Saudi fashion in general by considering the positive elements that help in their spread and negative elements that do not. Bye (Bye, 2010). explained that there is a need for essential solutions. Because of the rising complexities that hinder creative practices in clothing design, this research adopted a creative approach.

### 3. Objectives

The objectives of the research are to restrict the reasons behind the limited use by Saudi women of traditional costumes by identifying fashion's negative features while identifying the current, most preferred pieces of clothes women want to wear. The research also seeks to find creative solutions to traditional clothes using the TRIZ principles to fit in with women's requirements in the current era. Finally, a design for a contemporary fashion collection that reflects traditional Saudi clothing details is provided.

## 4. Methodology

### 4.1 Research methods:

A descriptive analytical method was applied to determine the commonly used garments among women in the Saudi society, and to restrict the reasons behind the limited use of traditional clothing. Furthermore, Systematic Innovation TRIZ principles were also applied to solve traditional fashion problems, and implement solutions in designing a collection of contemporary fashion with features of the traditional fashions of two tribes: Bani Malik and Bani slaim.

### 4.2 Population and sample sizes

In 2016, a total of 224 female students and faculty members in the Department of Fashion Design and

finding creative solutions in the contemporary design of clothing that reflects the cultural heritage of Saudi Textile at Princess Nourah Bint Abdul Rahman University were chosen as the research population. To find the sample size Equation (1) below was used where N is the population size, e is the margin of error, and z is the z-score based on 95% level of significance. The sample size was calculated to be 142 individuals.

$$Sample\ Size = \frac{\frac{z^2 \times p(1-p)}{e^2}}{1 + \left(\frac{z^2 \times p(1-p)}{e^2 N}\right)} \quad (1)$$

### 4.3 Research Tools

1. **Two Questionnaires** were set of questions used to complement the TRIZ forty principles. The first questionnaire consisted of four open-ended questions that aimed to find preferred clothing types, fabrics, also positive and negative factors of Saudi costumes. The second questionnaire consisted of 8 questions using a five-point Likert scale to evaluate the application of TRIZ principles in finding creative solutions to prevent the extinct of cultural heritage in traditional clothing and help in its spread.
2. **TRIZ 40-Principles:**( as shown in Figure 1) 1/Segmentation, 2/Taking Out/Separation, 3/Local Quality, 7/Nested Doll, 10/Preliminary Action, 15/Dynamization, 19/Periodic Action, 21/Skipping, 24/Intermediary, 25/Self Service, 30/Transparent Materials, 32/Changing the Color, 34/Discarding and Recovering, and 35/ Parameter Changes. Furthermore, TRIZ methodology steps in problem solving were used (Altshuller, Clarke, Shulyak, & Lerner, 2005); (Jiang, 2010); (Helena & Navas, 2013).
3. **Business Matrix 45:** Using the matrix of positive and negative factors to determine the appropriate TRIZ principles to solve creative technical questions or problems (IFR Consultants Ltd, 2016)



Concept design; TRIZ (Teoriya Resheniya Izobreatatelskikh Zadatch )

## TRIZ – 40 Principles

<b>1 Segmentation</b>	<b>21 Skipping</b>
<b>2 Taking out</b>	<b>22 Blessing in disguise</b>
<b>3 Local quality</b>	<b>23 Feedback</b>
<b>4 Asymmetry</b>	<b>24 Intermediary</b>
<b>5 Merging</b>	<b>25 Self-service</b>
<b>6 Universality</b>	<b>26 Copying</b>
<b>7 Russian dolls</b>	<b>27 Cheap short-lived objects</b>
<b>8 Anti-weight</b>	<b>28 Mechanics substitution</b>
<b>9 Preliminary anti-action</b>	<b>29 Pneumatics and hydraulics</b>
<b>10 Preliminary action</b>	<b>30 Flexible shells and thin films</b>
<b>11 Beforehand cushioning</b>	<b>31 Porous materials</b>
<b>12 Equipotentiality</b>	<b>32 Colour changes</b>
<b>13 "The other way round"</b>	<b>33 Homogeneity</b>
<b>14 Spheroidality - Curvature</b>	<b>34 Discarding and recovering</b>
<b>15 Dynamics</b>	<b>35 Parameter changes</b>
<b>16 Partial or excessive actions</b>	<b>36 Phase transitions</b>
<b>17 Another dimension</b>	<b>37 Thermal expansion</b>
<b>18 Mechanical vibration</b>	<b>38 Strong oxidants</b>
<b>19 Periodic action</b>	<b>39 Inert atmosphere</b>
<b>20 Continuity of useful action</b>	<b>40 Composite materials</b>

Fig. 1 TRIZ-40 Principle.

Source (TRIZ 40 Design Principle - University of Southampton)

#### 4.4 Research procedures

1. Determine the level of innovation: There are five levels of innovation: routine solutions, small corrections in existing systems, major improvements that solve contradictions in typical systems of a particular branch of industry This is where creative design solutions appear, solutions based on the application of new scientific principles that “replace the original technology with the new technology,” and innovative solutions based on the discoveries that were not discovered before. The goal of TRIZ is to assist in the development of design tasks in three or four levels (Helena & Navas, 2013, p. 76)
2. Contradictions arise by using the matrix of positive and negative factors to determine the appropriate TRIZ principles needed to solve creative technical questions or problems. Contradictions were identified from the results of the questionnaire, which was distributed to a sample of female students and faculty.
3. The ideal solution, the “ideal rule,” means that any technical system tends to reduce costs. Besides, any technical system over time tends to become more ideal. The optimal solution can be

determined after understanding the direction of the technical development of the system, and later seeking verification of the results by using the appropriate TRIZ principles to reach an ideal solution through the matrix of Business Matrix 45 (IFR Consultants Ltd, 2016).

The objective here is to develop technical systems to propose appropriate solutions for the dissemination of cultural heritage in traditional fashion, and to design contemporary fashion collections with features of traditional fashion.

#### 5. Results

##### 5.1 Questionnaire results

The research sample group’s opinions on traditional costumes indicated that: 66.90 % of participants believe that traditional clothing is characterized by its colors, beautiful decoration, and how it was adorned, 15.49% found that it provides modesty, and 12.68 % that it provides convenience. Just 4.93% of women



found that traditional fashion is characterized by its broad design (see Table 1).

**Table 1** Reasons for Wearing Traditional Clothing

Due to used	<i>Colors, decoration, and how it was adorned</i>	<i>Provides modesty</i>	<i>Provides comfort</i>	<i>Characterizing the design lines</i>	<i>Total</i>
<i>Iterations</i>	95	22	18	7	142
<i>Percent %</i>	66.90%	15.49%	12.68%	4.93%	100%

Participants who believe that the non-use of traditional fashion is high due to the high price and length of production time stood at 87%, while 21.83% believe

that traditional fashion is impractical, 21.13% said it was unvaried and does not keep pace with fashion, and 28.17% believe in causes (see Table 2).

**Table 2** Reasons Not to Use Traditional Costumes

Reasons not to use traditional costumes	The high price and length of product time	Impractical	Unvaried and does not keep pace with fashion	All causes	Total
Iterations	41	31	30	40	142
Percent	28.87%	21.83%	21.13%	28.17%	100%

Participants who prefer to use various types of clothes was 56.34%, while 33.10% prefer to use dresses, 10.56% prefer using trousers and blouses, and

71.8% prefer using a variety of fabrics in clothes, while 28.2% prefer specific fabrics based on (see Table 3).

**Table 3** Favorite Clothing Types & Fabrics

Sorting	Favorite Clothing Types				Favorite Fabrics		
	Variety	Dress up	Slacks and a blouse	Total	Variety fabrics	Specific fabrics	Total
Iterations	80	47	15	142	102	40	142
Percent	56.34%	33.10%	10.56%	100%	71.8%	28.2%	100%

## 5.2 Classification and analysis by a Business Matrix 45

Based on these results, a Business Matrix 45 (IFR Consultants Ltd, 2016) was used to solve the negative elements of traditional costumes.

In Table 4, the contradiction matrix of positive and negative factors of Saudi costumes is given a Worsening Features in (Production factor: 7/ Production Cost, 8/Production Time) and (Systems Factor: 27/Convenience, 28/Adaptability/Versatility). Whereas an Improving Features in (Production factor:

6/Production Spec) and (Systems factor: 32/Stability). TRIZ principles (1/Segmentation, 2/Taking Out/Separation, 3/Local Quality, 7/Nested Doll, 10/Preliminary Action, 15/Dynamization, 19/Periodic Action, 21/Skipping, 24/Intermediary, 25/Self Service, 30/Transparent Materials, 32/Changing the Color, 34/Discarding and Recovering, and 35/ Parameter Change) can be used to achieve creative solutions to address the problems shown. Positive factors in traditional costumes can be adopted in designing a variety

of contemporary fashion collections; negative factors need to be isolated or discarded (see Table 5).

**Table 4** Principles of TRIZ Used to Solve Traditional Costumes Problems Using Business Matrix 45

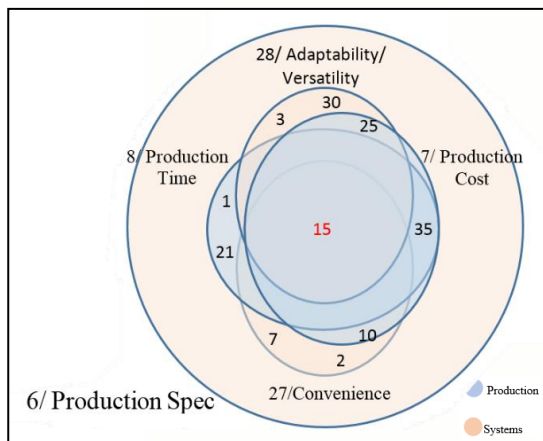
Worsening Feature  Improving Feature		Production		Systems	
		7/Production Cost	8/Production Time	27/Convenience	28/Adaptability/Versatility
		High Cost	Time Execution	Clothes Weight Width & Length Exaggeration	Fabric, Materials Decoration, Undiversified
(Production) 6/Productio n Spec/	Decoration Methods	15 25	1 35	2 15	3 15
		10 35	21 15	7 10	30 25
(Systems) 32/Stability	Decoration Lines, Color, Construction Lines	10 1	10 15	32 35	31 30
		35 24	2 19	30 25	3 2

**Table 5** Proposed Creative Solutions for Traditional Costumes Using TRIZ Principles

Positives	Negatives	Principle's number	Proposed solutions for designing costumes
Modesty  Simple construction lines	Lack of diversity in clothes	35	Use a variety of decent clothes
	Failure to keep pace with fashion trends in lines and fabrics.	30, 2	Use of contemporary clothes
	Exaggerating in length and width & inconvenience	3	Use of lightweight materials
		34	Adjust the width and length.  Recover discarding elements in a new way
Concentrating on motif's decoration in costumes	The weight of costumes	2, 1	Isolate distinctive decorative motif
	Exaggeration in the decoration.	35	Simplify of the decoration
		3, 19	distribute decorative motifs creatively
Using hand crafts on costume decorating	High production cost	2, 3	Reduce the amount of hand embroidery
	Heavyweight costume	35	Replace heavy material with light weight material.
	Long production time	10, 15	Use traditional decoration motif in manufacturing trims, accessories, woven, and printed or embroidered fabrics.
		19, 21	
Using saturated colors in costumes decoration	Lack of adoption fashion color's trends	35	Adopt color trends in fashion. using wash and wear fabrics
		32	Adopt decorative traditional colors in contemporary clothes
		24, 7	

### 5.3 The Appropriate TRIZ principles for solving traditional costumes

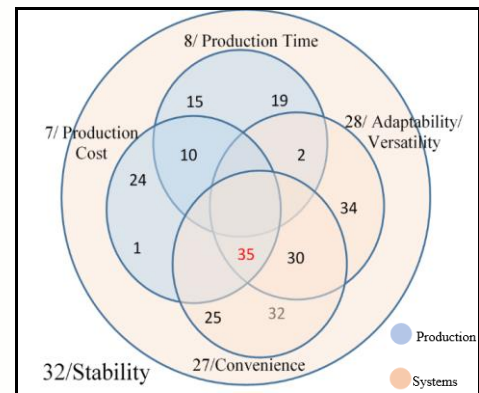
Figure 2 shows that the TRIZ principle 15/dynamization is appropriate to maintain the positive factors of traditional fashion by developing a system of traditional costume production while reducing difficulties such as length of time and high cost of production, inconvenience, and inadaptability of designs for each item, requirements, and fashion trends. This is achieved by converting the manual work of producing traditional decoration to machine work, either by using machine embroidery, jacquard woven textile, or printing. This can be achieved by focusing the positive factors in decorative motif design, its implementation and colors, dividing it into decorative units "1/Segmentation", then repeating and coordinating it by using Digital Systems "25/Self Service" to produce decorative textiles either by embroidering, printing, or jacquard woven, using principle 7, 24,30.



**Fig. 2** Appropriate TRIZ Principles for Solving Traditional Costumes' Disadvantages to Maintain Its Decorative Style

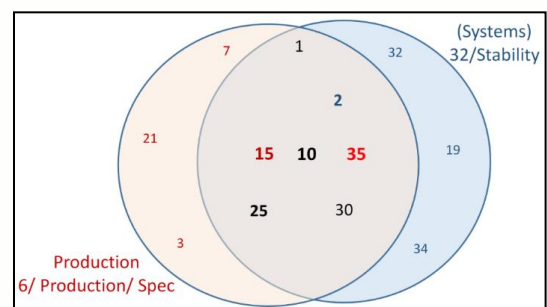
Figure 3 shows appropriate TRIZ principles for solving traditional costumes' problem and its heritage stability, which includes color. Production lines and decoration lines using principle 35/Parameter Changes, for example, can replace heavy material with light weight material, use a variety of decent clothes, and use contemporary clothes. These principles are supported by using one or more of the following principles 2/Taking Out/Separation of negative factors, and using positive factors by applying principle 10/Preliminary Action for example: they can use traditional decoration motif in manufacturing trims, accesso-

ries, woven, and fabrics, and principle 30 with thin and flexible materials.



**Fig. 3** Appropriate TRIZ Principles for Solving Traditional Costumes' Problem and Its Heritage Stability

Figure 4 shows appropriate TRIZ principles to eliminate traditional costumes' disadvantages in the long term using principles 15,10, and 35. These principles are supported by using one or more of the following principles 1,2, 25 and 30. This can be achieved by isolating the positive factors in decorative motif design, its implementation and colors, dividing it into decorative units" 1 / Segmentation", then repeating and coordinating It by using computer "25/Self Service " on Lightweight fabrics, Trims or Accessories. By using lightweight and fine materials in textile printing jacquard woven fabric or embroidering method "30/Transparent materials".



**Fig. 4** Appropriate TRIZ Principles to Eliminate Traditional Costumes' Disadvantages in the Long Term

#### 5.4 The application of Innovative solutions for designing contemporary fashion collections using features of traditional costumes of Bani Malik and Bani Slaim tribes

In Figure 5, the first collection designed using TRIZ principles shows that the designs were made by applying a selection of TRIZ principles to come up with a contemporary afternoon collection. The collection was inspired by the aesthetic values of the Bani Malik tribe's costumes, which are modesty, beauty, saturated colors, and diversity in decoration. Based on the questionnaire results, costumes' negativities were discomfort, intensity of decoration, and failure to adapt to fashion trends. Therefore, a set of TRIZ principles were adopted to eliminate the negative features and to transform them into a modern fashion collection that can be

produced wholesale. Eight principles were used to design the collection shown in Figure 5. Principle 35/ Parameter Changes inspired the replacement of the long dress with a variety of contemporary clothes. Next, principles 2, 25, and 30. By substituted heavy fabrics in to thin fabric that are "wash and wear." Finally, colors were changed, based on principle 32 As for manufacturing improvement, principles 1, 15 and 10 were adopted to divide the decorations into several smaller parts, transfer handmade work into mechanical work, and to manufacture ready-made beaded trims to maintain the aesthetic values of Bani Malik's costumes.



**Fig. 5** Contemporary Afternoon Fashion Collection, Inspired by the Aesthetic Values of Bani Malik Tribe



Figure 6 shows the second designed collection from the Bani Malik tribe's costumes. The second designed collection aims to give a variety of all-day contemporary clothes. The designs were also inspired by the Bani Malik tribe's costumes. The

main principles adopted in collection 1 were 7/, 34. The two principles allowed for creatively recounting parts of the costumes then printing them onto contemporary fabrics.



**Fig. 6** Contemporary All-day Fashion Collection, Inspired by the Aesthetic Values of Bani Malik Tribe.

Figure 7 shows the third collection inspired by Bani Slaim tribe's costumes. The third designed collection is a set of contemporary evening wear inspired by the aesthetic values of the Bani Slaim tribe. As per the questionnaire, the costumes' negatives are an exaggerated width in the overall garment as well as the sleeve's length and width. The applied TRIZ principles aimed to eliminate the negatives while aiming to keep the positive attributes, which are modesty, beauty, and diversity in

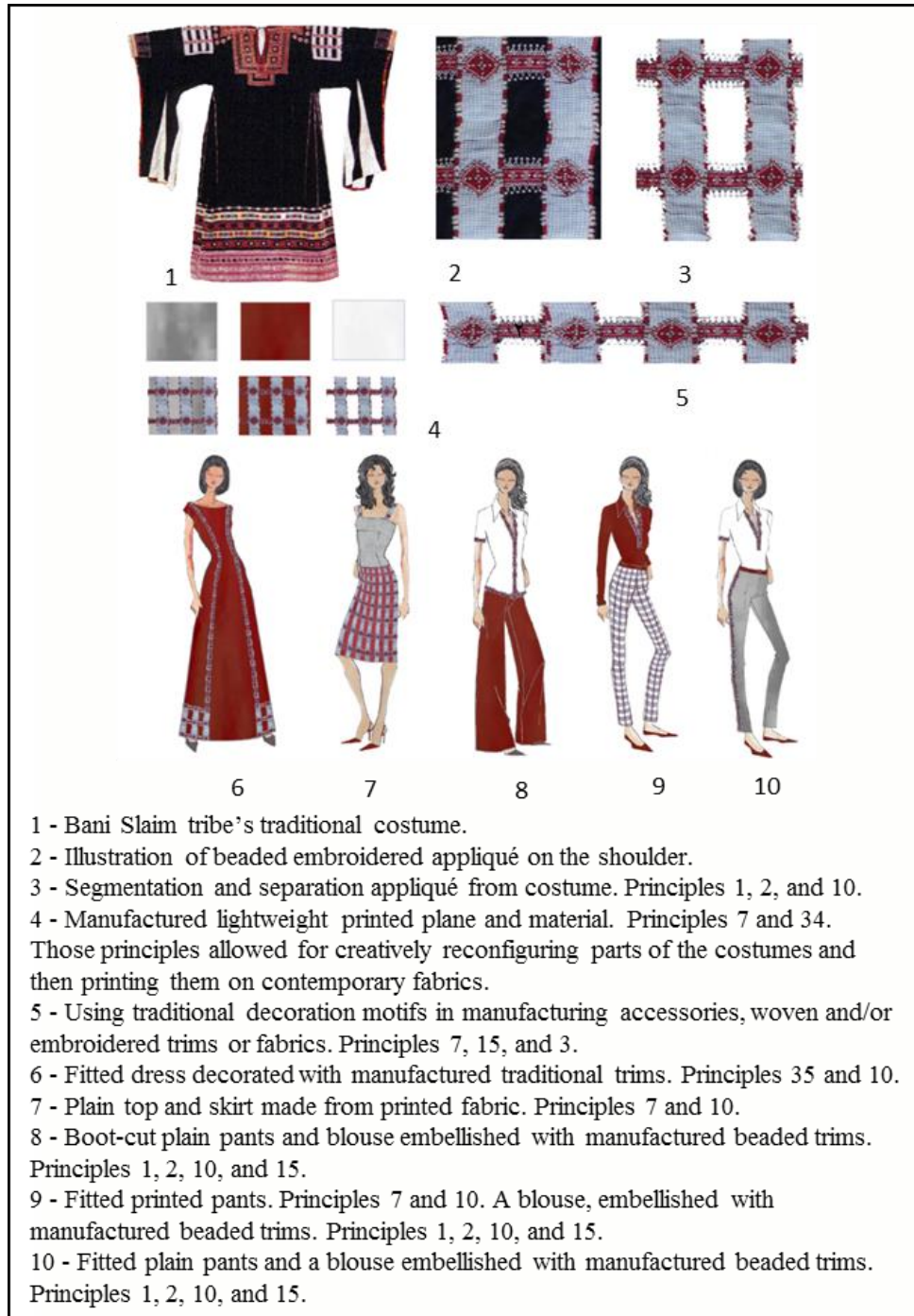
decoration. To start, principle 35/ Parameter Changes was applied to disseminate the cultural heritage of the costume and design a modern collection that considers women's preferences. Also, it contributes to benefitting from an applique unit at the upper sleeves area by applying it to produce fabrics and woven trims that can be printed or mechanically embroidered. The parts can then be distributed in attractive positions using principles 7, 15, and 3.



**Fig. 7** Contemporary Evening Wear Collection, Inspired by the Aesthetic Values of Bani Slaim Tribe.

Figure 8 shows the fourth designed collection, which consists of diverse contemporary all-day clothes also inspired by the Bani Slaim tribe's costumes. It was designed by applying TRIZ principles aimed at eliminating the negatives and retaining the positive attributes, which are modesty, beauty, and diversity in decoration. To start, principle 35 was applied to disseminate

the cultural heritage of the costume and design a modern collection. Also, it benefits from an appliquéd unit at the upper sleeve area by applying it to produced fabrics and woven trims that can be printed or mechanically embroidered. The parts can then be distributed in attractive positions using principles 7, 10, 15, and 3.



**Fig. 8** Contemporary All-day Fashion Collection, Inspired by the Aesthetic Values of Bani Slaim's Tribe



### 5.5 Evaluation solutions to the TRIZ principles: Consumers' Opinions about the New Fashion Collection Inspired from the Traditional Outfits of the Bani Malik and Bani Salim Tribes

Fig 9. shows that for the fashion designs inspired by Bani Malik and Bani Salim tribes, the cumulative approval percentage for the inclusion of traditional costume decoration and traditional dress colors was 83.90-90.26% and 81.9-93.63%, respectively. These percentages indicate that principle 10 contributed to the use of the cultural heritage of traditional fashion with the use of principle 2 to isolate the negative factors such as loose long dress and only focusing on the positive factors such as decoration by using principle 1 to fragment the decorations into units. In addition, principle 19 is used for the repetition of the decoration units, and principle 34 is employed to change the colors of the manufactured traditional fabric trims or decorations to modern fashion colors.

Moreover, 86.90-79.40% accepted the variety of designs and their suitability for their needs. Likewise, 82.03-77.90% agreed on the suitability of the collection for events and activities. This is an indicator of the effectiveness of using principles 35, 34, 30, and 32 in

addressing the disadvantages of traditional costumes (which include the lack of variety in designs and fabrics, exaggerated looseness, and heavy weight) by changing the traditional cloth properties via diverse designs, fabrics, transparency, and colors to suit the requirements of the present era.

Furthermore, 80.52-89.14% of the study sample considered the designs in line with fashion trends. Additionally, 88.39-89.51% and 86.90-86.14% agreed on the simplicity of designs' lines and suitability of size and placement of the decorations, respectively. This shows the usefulness of using principles 25, 7, and 3 to achieve a quick spread of the cultural heritage of traditional fashion.

Moreover, 85.67-79.40% of the study sample stated their willingness to buy these designs if they are readily available in the market. This highlights the importance of principle 15 in preventing the extinction of the cultural heritage of traditional fashion and helping its spread and continuity through mass production.

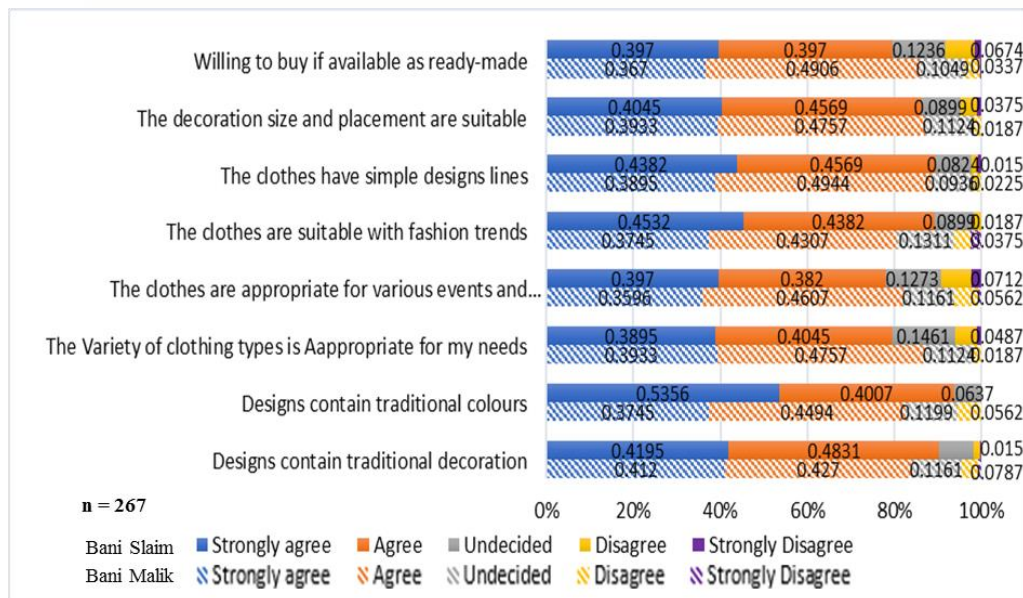


Fig. 9 The opinions of consumers about contemporary fashion designs inspired by Bani Malik and Bani Salim tribes



## 6. Discussion:

The colors, decorations, and adornments of traditional Saudi costumes are all highly positive factors in traditional costumes. On the other hand, high cost, time execution, clothes weight, width & length exaggeration, decoration materials, and undiversified designs & fabrics are considered as negative factors in traditional costumes, which limits the spread of traditional costumes. Fedá (2003) Explained that some traditional clothing can require two to five months for its execution, depending on the amount of embroidery and the skill of the women who embroider the garments. Traditional clothes can disrupt movement due to its heavy weight and the use of real materials in decorating, such as golden and silver lead beads and coins

Women prefer the diversity in the use of clothes and fabrics to achieve comfort and adaptability within fashion trends, and to meet their needs. These specifications are not available in traditional costumes, which has led to the demise of traditional costumes Al-Bassam (1985) Confirmed that some of the fashion heritage elements aspects are considered useless because they conflict with modern circumstances by making the necessary adjustments to the positive heritage elements, and using it as an important inspirational source.

Choosing the suitable TRIZ principle depends on problem. Therefore, it was found through analysing the contradiction matrix that the creative solution for spreading positive traditional costumes' elements is achieved using principle 35/ Parameter Changes. Whereas the Benetton Inc. adopted principle 10/Preliminary Action to solve cost & time production to ensure that fashion is presented in time (Mann, 2002). Moreover, principle 35/ Parameter Changes is supported using the ideal solutions in principles 15/Dynamization and 10/Preliminary Action for reducing product cost and time. Helena & Navas (2013) Explained that any technical system tends to reduce costs, and any technical system through its duration tends to become more ideal.

This study was limited to finding the principles of Therese that can be applied and proposing design ideas to show how to reduce the disadvantages of traditional fashion. It also supports and improves the positive aspects to meet the requirements of the current era and fashion trends, as well as to preserve the cultural heritage of fashion and dissemination. Therefore, the study requires the concerted efforts of:

1. researchers and those interested in preserving the cultural heritage of the traditional Saudi

costume to establish a digital library, including drawings and models of the types and forms of fashion and aesthetic values;

2. the practitioners of fashion design taking advantage of the principles of Therese to design costumes that match the requirements and needs of the era and fit all age groups, inspired by the traditional costumes of various kingdom regions.
3. fashion producers to contribute to the conversion of Saudi cultural heritage costumes from individual work to industrial production. This must start with basic models, special details, and identification of materials and production processes and end in production and marketing.

## 7. Conclusion

Our results show that the colors, decorations, and adornments of traditional Saudi costumes are all highly positive factors, and reasons why women would wear them. Negative factors, which limit the wearing of traditional clothes, include high cost and long production time, impracticalities, such as the heavy weight of the clothing and exaggerated widths and lengths of the designs, and the lack of variety in styles and fabrics.

Once we determined the factors that limit women's use of traditional costumes in modern Saudi society, we compiled the results in Business Matrix 45. We then applied 14 TRIZ principles to achieve creative solutions to address the problems found: 1/Segmentation, 2/Taking Out/Separation, 3/Local Quality, 7/Nested Doll, 10/Preliminary Action, 15/Dynamization, 19/Periodic Action, 21/Skipping, 24/Intermediary, 25/Self Service, 30/Transparent Materials, 32/Changing the Color, 34/Discarding and Recovering, and 35/ Parameter Changes.

TRIZ principles linked to various aspects of design and production can be used to achieve the desired outcome for the problems identified by other TRIZ principles. For example: one or more of the TRIZ principles linked to production (10, 25, and/or 35), can be used to achieve TRIZ principle 15/Dynamization; one or more of the TRIZ principles linked to Systems Factor: (1, 2, 10, 15, 25,30,32 and/or 34) can be used to achieve principle 35/ Parameter Changes; or principle 1 can be used to achieve principle 10/Preliminary Action.

We have demonstrated that TRIZ principles can be used to help solve some of the negative elements of

traditional Saudi costumes that prevent their use by women in modern Saudi society. Applying TRIZ principles can aid in creative thinking to develop innovative solutions for designing appealing contemporary fashion collections that are feature elements of traditional costumes.

This study shows that it is important to balance cultural heritage with the requirement for clothes that are comfortable, practical, and fashionable for use in modern society. Further work is required to determine the level of customer satisfaction with contemporary designs adapted from traditional costumes. Clothes, then, need to be designed so they can be mass produced to ensure a long-term legacy of traditional design elements.

### 8. Acknowledgements

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## AUTHOR BIOGRAPHIES

**Wafa Hassan Shafee** is an Associate Professor of Fashion & Textile Design. College of Art & Design, Princess Norah Bint Abdulrahman University, Riyadh, Saudi Arabia. She has been a faculty member since 1985. Her research interest lies in the costume and creative fashion design and she has authored 3 books, also she supervised PhD and MA dissertations

**Laila Feda** is an Associate Professor of Fashion & Textile Design. College of Art & Design, Princess Norah Bint Abdulrahman University, Riyadh, Saudi Arabia. She has been a faculty member since 1988. She gained Her Doctoral dissertation in 2003. Her research interest lie in the area of folkloric costume and creative design, ranging from theory to design to implementation.