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Development of cotton: Wool knitwears on khadi system and evaluation of their acceptability

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Abstract
Designing is the virtuous feature of a fabric or a garment, which creates interesting visual aspects on its surface and beautify its appearance. The present study has been carried out with the objective of designing of cotton wool blended knitted khadi apparels. To attain this objective, cotton (Mech I) and wool (Indian cross bred- Rambouillet/local sheep of Jammu and Kashmir and Himachal Pradesh) fibres were blended in three ratios 90% cotton -10%wool, 80% cotton-20% wool and 70% cotton-30% wool in hand spinning system and hand spun yarns were prepared. Double jersey knit fabrics were prepared on flatbed hand knitted hosiery machine of 10-12 gauge. After that, six prototypes of sweater, top and jacket were developed. The acceptability of designed khadi garments was assessed on the basis of colour combination, uniqueness in design, aesthetic appeal using three point rating scale. It was found that all the khadi garments were accepted by respondents.

Keywords: cotton wool blend*,* khadi system, prototypes, consumer acceptability

1. Introduction

Khadi industry mainly produces handspun and hand-woven cloth made of cotton, silk, or wool yarns. The yarns are spun on a spinning wheel called charkha and woven on handloom. Khadi industry also produces woven blends called polyvastra, which is blend of cotton or wool with polyester. It is widely accepted in fashion circles. Moreover, Khadi sector based on wool fiber produces various woolen products viz. blanket, tweed, apparels. etc (Gupta, *et al*.2005). This sector is providing employment to rural masses.

Today's consumer is becoming more and more demanding in terms of quality and design. They require new textile materials with new or improved properties. Manufacturers, designers, researchers constantly need to do product innovation to satisfy customer's requirement (http://rajkhadi.rajasthan.gov.in/index.aspx*).*

Knitted products, whether fabric or garments, are mainly produced in mills. Their production in khadi sector is limited. Cotton wool blend fabrics are growing in popularity due to increased consumer demand for styling, comfort and for eco-friendly natural fibers. Moreover, in Indian climatic conditions, during pre and post winter season use of cotswool is very popular for apparel purpose (Charankar, 2007) [2].

Study was planned to develop trendy knitwear in cotton: wool blended khadi knitted garments. Prototypes of knitwear were developed and their acceptability was assessed.

2.1 Material

Mech-I cotton obtained from KVIC Pooni plant of Raibareilly and crossbred wool (Rambouillet and Chokla) produced in Fatehpur farm of Rajasthan were used in present study.

2.2 Method
2.2.1 Development of cotton wool blended yarns

Cotton: wool yarns in 90:10, 80:20 and 70:30 ratios were prepared in hand spinning system. All the yarns were spun in count of 55-62 tex. New Model Charkha, (Chattopadhyay *et al*., 2003) [1] a modified version of Amber charkha used in khadi system for woolen spinning, was used to impart twist to yarns.

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2.2.2 Development of designs

Prototypes of ladies garment were developed which included top, sweater and jacket. Designing of top, jackets and sweater was done in the following steps:

Different designs for ladies tops, sweaters and jackets were developed for college going girls and woman keeping in mind their preferences. These were developed by making modification into existing design and with new design ideas. Latest trend in fashion was also taken into consideration while designing. Total 18 designs were prepared (6 designs for each type i.e. ladies top, sweaters and jackets). 3 designs for each type of garment were planned by adding colours/designs in knitted fabric (fabric dyeing) while in other 3 designs, coloured yarns were incorporated at the stage of fabric manufacturing (yarn dyeing) in each garment category. Designs were sketched on a white sheet. To get favorable results, various desired details and features were used on design sheets. Colours of autumn winter, 2015- blue, pink, purple, green, orange and brown were selected according to forecasted colour scheme given by Pinterest.

2.2.3 Evaluation of developed designs-

Developed designs were evaluated by panel of judges. The design sheets were displayed to the respondents and evaluated on the basis of - Colour combination, Aesthetic appeal, Uniqueness in design. Three point rating scale was used as given below:

Table 3.5: Rating scale

Rating No.	Rating
3	Excellent
2	Good
1	Fair

Weighted mean score was calculated for each criterion. Total weighted mean score of each design was calculated by adding score of each criterion. Out of 18 designs 2 designs each for ladies tops, sweaters and jackets were selected on the basis of total weighted mean score. Thus total six designs were selected for prototype preparation.

2.2.4 Development of selected designs into prototype

Knitted fabrics were constructed on 10-12 gauge, flat bed hand knitting machine. Double jersey fabric was constructed with the help of latch needles.

Garments were manufactured from blended cotton: wool knitted fabrics (2 garments from each blend ratio that is 90C:10W, 80C:20W and 70C:30W respectively). Yarns and fabrics were dyed as per the design by cross dyeing method using direct and acid dyes before construction of garment. Fabric/yarn was first dyed with direct dye and then acid dye.

Assessment of developed prototype

A panel of 200 respondents was selected to judge and evaluate constructed tops, sweaters and jackets. All respondents were selected from Department of Home Science because they have knowledge of designing and latest fashion trends.

Tops, sweaters and jackets were draped on dummies and shown to judges to analyze the developed tops, sweaters and jackets in knitted khadi.

4 criteria were decided for evaluation of tops, sweaters and jackets i.e. Colour combination, Aesthetic appeal, Uniqueness in design and Cost. Acceptability of the designed khadi ladies tops, sweaters and jackets was evaluated on the basis of three point rating scale.

Pricing and costing of the developed prototype

For price determination, material cost (includes fabric cost, thread cost, needle cost and accessory cost), drafting and stitching cost was also included and 20% extra cost was added as profit margin. Fabric cost included cost of fiber, yarn manufacturing cost and fabric knitting cost.

3 Results and Discussion

Table 1: Consumer Preferences for design sheets for jacket, top and sweater

Category	Design No.	Uniqueness of Design	Colour combination	Aesthetic appeal	Total Score
		Weighted mean score			
Fabric dyed jacket	1.	2.56	2.44	2.44	2.48
	2.	2.44	2.36	2.42	2.40
	3.	2	1.82	2	1.94
Fabric dyed sweater	1.	2.2	2.24	2.42	2.28
	2.	2.86	2.84	2.96	2.88
	3.	1.92	1.98	2.24	2.04
Fabric dyed top	1.	2.2	2.24	2.42	2.28
	2.	2.9	2.68	2.8	2.8
	3.	2.94	2.94	2.96	2.94
Yarn dyed jacket	1.	2.86	2.78	2.56	2.73
	2.	2.32	2.3	2.12	2.24
	3.	2.78	2.58	2.58	2.64
Yarn dyed sweater	1.	2.2	2.24	2.42	2.28
	2.	2.94	2.94	2.96	2.94
	3.	2.32	2.14	2.16	2.20
Yarn dyed top	1.	2.12	2.02	2.36	2.16
	2.	2.44	2.36	2.42	2.40
	3.	2.9	2.68	2.8	2.8

Table 1 shows that design no. 1 in fabric dyed jacket category, design no.2 in fabric dyed sweater and design no. 3 in fabric dyed top category got highest weighted mean score. Likewise design no. 1 in category of yarn dyed jacket, design no.2 in yarn dyed sweater and design no. 3 in yarn dyed top got highest weighted mean score. These six best preferred designs were developed into prototype.

Acceptability of designed garments

As mentioned above, total six prototypes of three ladies garment were developed which include top, sweater and jacket. Three fabric dyed and three yarn dyed garments were

prepared. These were evaluated by panel of judges on the basis of color combination, aesthetic appeal, uniqueness in design and cost to determine their acceptability. Result of consumer acceptability has been presented below:

Table 2: Acceptability of fabric dyed garments

Articles (Fabric dyed)	Cost of garment (Rs)	Colour combination (w.m.s)	Aesthetic appeal (w.m.s)	Uniqueness in design(w.m.s)	Cost	
					Yes (%)	No (%)
Jacket (70 C:30W)	1148	1.77	1.71	1.77	60	40
Sweater (80C:20W)	1400	2.73	2.76	2.85	88	12
Top (90C:10W)	1150	2.31	2.25	2.19	68	32

w.m.s. = weighted mean score

Table 2 shows that fabric dyed garments of different blends (90-10, 80-20 and 70-30), were preferred differently by consumers. Sweater of blend 80 C-20 W got maximum weight mean score value in terms of colour combination (2.73), aesthetic appeal (2.76), uniqueness in design (2.85).88% consumers has found cost appropriate. Top of 90 C-10 W blend has obtained weighted mean score of 2.31 for colour combination, 2.25 for aesthetic appeal, 2.19 for uniqueness in design and cost (68%). 70 C-30W jacket is least preferred by consumers as it has got lowest w.m.s. for colour combination (1.77), aesthetic appeal (1.71), uniqueness in design (1.77). Cost has been accepted by 60% consumers. So it can be concluded that sweater has been most accepted by consumers. Top has also been found aesthetically pleasing as it has been rated good to very good. Jacket (70-30%) is lowest in the rating scale of consumers.

Table 3: Acceptability of yarn dyed garments

Articles (yarn dyed)	Cost of garment (Rs)	Colour combination (w.m.s)	Aesthetic appeal (w.m.s)	Uniqueness in design (w.m.s)	Cost	
					Yes (%)	No (%)
Jacket (70 C:30W)	1229	1.95	1.89	1.68	80	20
Sweater (80C:20W)	1842	2.67	2.79	2.79	76	14
Top (90C:10W)	1556	2.88	2.91	2.79	100	0

w.m.s. = weighted mean score

On comparing consumer preference for yarn dyed garments, it is evident that top of 90 C-10 has got highest preference in terms of colour combination (2.88 w.m.s), aesthetic appeal (2.91 w.m.s) uniqueness (2.79 w.m.s) and cost has been found appropriate by all the consumers. 100% consumers' opinion was that they would love to buy this top since it has been found most attractive. Second preference is given to sweater for its good colour combination (2.67 w.m.s), good aesthetic appeal (2.79 w.m.s) and uniqueness (2.79 w.m.s) and cost accepted by 76% consumers. Jacket has been least preferred in this group as it is lowest in rating scale of consumers; colour combination (1.95w.m.s), aesthetic appeal (1.89 w.m.s), uniqueness (1.68 w.m.s). However, cost of jacket is accepted by80% consumers.

Yarn dyed jacket, sweater and top

Conclusion
Present study was a step towards product innovation and explored the possibility of creating cotton and cotton blended knitted garments in khadi sector so as to provide trendy and innovative khadi knitwear to consumers. Garments were accepted by respondents as these got high weighted mean score between excellent to good. Result showed that cotton wool blended knitwears can be constructed in khadi village industry.

Fabric dyed jacket, sweater and top

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