Evaluation of commercial utility of the developed knitted fabrics

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■ **ABSTRACT :** Knitted are elastic, porous fabrics and can be constructed faster and at less production cost compared to woven fabrics. These are characterised by low weight of fabric, comfort of wearing and little to no aftercare. In the present study, blended knitted fabrics developed in two different yarn counts were assessed on the basis of several factors of evaluation including production feasibility, production cost, visual impact, handfeel and saleability. An interview schedule was employed to study the opinions of respondents having expertise in knitted fabric construction, machinery handling and their judgment for developed knitted fabrics was recorded. Findings revealed that blended knitted fabrics wers highly production feasible. Parameters like visual impact, handfeel, fabric performance for clothing construction and saleability scored positive opinions as well.

■ **KEY WORDS:** Commercial, Fabrics, Feasibility, Knitting

Apparel industry is a labour-intensive trade, which is marked by low-fixed capital investment, a huge range of commodity designs and hence, input materials, variable order quantities, heavy competition and struggle and often high demand on product quality (Nayak and Padhye, 2018). In textile business, fabric performance is still out of the engineering design due to difficulty in designing the appropriate properties of fabrics (Niwa, 1973). Raw material or yarn related defects during knitting spoil the aesthetics of the fabric and hence, causes a gigantic quality issue (Ambastha, 2017). Before any fabric is put into mass production, it must be checked for its production feasibility. Acceptable quality of the fabric should be attainable using reasonable expertise and production process should be scalable for mass production. The end product of the production process, usually fabrics or finished garments, have to be commercially profitable. The produced fabric should be commercially acceptable having imperfections below a reasonable level. The product should also have an aesthetically pleasing appearance and handfeel so as to be commercially saleable. In the current review, commercial utilization of developed knitted fabrics was evaluated by conducting a survey in knitting industry of Ludhiana.

■ **RESEARCH METHODS**

Four blended knitted fabrics were developed in

proportion of 50 per cent silk: 50 per cent viscose and 40 per cent silk and 60 per cent viscose, each in two different counts (15 Nm and 20 Nm). Developed knitted fabrics were assigned codes for ease of discussion and understanding. Fabric knitted in 50 per cent silk: 50 per cent viscose yarn and 15 Nm count was called S_1 and fabric made in 40 per cent silk: 60 per cent viscose in the same count was assigned code S_2. In case of 20 Nm yarn count, codes S_3 and S_4 were the assigned to fabrics with 50 per cent silk: 50 per cent viscose and 40 per cent silk: 60 per cent viscose, respectively. Commercial utilization of developed knitted fabrics was evaluated by conducting a survey in thirty knitting units of Ludhiana. Purposive sampling technique was utilized for selection of knitting units. An interview schedule was utilized for carrying out the survey. Production managers, knitting supervisor and machine operators were interviewed for collection of data. Knitted fabrics were analysed on the basis of parameters like production feasibility, production cost, visual impact, handfeel, fabric performance for clothing construction and saleability.

■ **RESEARCH FINDINGS AND DISCUSSION**

The results obtained from the present investigation as well as relevant discussion have been summarized under following heads :

Production feasibility:

This section investigates the acceptability for

developed fabrics and large-scale production without much difficulty. The term "feasibility study" is often used in context of product development processes (Bause *et al.,* 2016). On the basis of respondents' expertise in knitted fabric construction and machinery handling, their opinions for knitted fabrics were recorded. Blended knitted fabrics were evaluated on the basis of parameters *viz.*, probability of yarn breakage, needle breakage, number of fabric defects, ease of finishing, ease of handling and ease of sewing or linking.

Yarn breakage:

The machine stops instantly when the yarn breaks (Textile Committee, 2018). It can be envisaged from table 1 that majority of the respondents (56.67%) were of the view that there will be low yarn breakage during knitting. It was opined that if appropriate machine gauge was selected for knitting, occurrence of yarn breakage will not be a hindrance. The arrangement of needles on knitting machine largely affects the final outcome of fabric. Also strength of the yarn has been found appropriate for knitting, therefore, probability of yarn breakage was said to be very less. As the Z values of comparison between low and medium/ high were found to be significant for all the fabrics, it was clear that yarn breakage cannot be apprehended as troublesome factor during knitting.

Needle breakage:

Table 2 elucidates that 70 per cent of respondents

Table 1 : Distribution of respondents according to their opinion on probability of yarn breakage during knitting (n=30)

Fabric	No. of respondents based on their opinions on yarn breakage			Z value
	High (f)	Medium (f)	Low (f)	
S_1	5 (16.67)	8 (26.67)	17 (56.67)	3.65*
S_2	6 (20.00)	9 (30.00)	15 (50.00)	3.29*
S_3	5 (16.67)	10 (33.33)	15 (50.00)	3.65*
S_4	5 (16.67)	9 (30.00)	16 (53.33)	3.65*

f- Frequency, Figures in parentheses indicate percentages
*Significant, Z value for differences of two proportions at one tail and 5 per cent level of significance

Table 2: Distribution of respondents according to their opinion on probability of needle breakage during knitting (n=30)

Fabric	No. of respondents based on their opinions on needle breakage			Z value
	High (f)	Medium (f)	Low (f)	
S_1	2 (6.67)	7 (23.33)	21 (70.00)	4.75*
S_2	5 (16.67)	5 (16.67)	20 (66.67)	3.65*
S_3	3 (10.00)	6 (20.00)	21 (70.00)	4.38*
S_4	4 (13.33)	7 (23.33)	19 (63.33)	4.02*

f- Frequency, Figures in parentheses indicate percentages
*Significant, Z value for differences of two proportions at one tail and 5 per cent level of significance

thought that there will be minimal cases of needle breakage during knitting for fabric S_1. It was comprehended that if suitable machine gauge was utilized for knitting, needle breakage will not be an obstacle. Since nep yarn was utilized for knitting, the machine gauge should be selected after trials to decrease the production cost. Besides this, strength of the yarn was found appropriate for knitting, therefore, probability of needle breakage was said to be very low. Since Z values calculated for comparison between low and high/ medium were found to be significant ($P \leq .05$), it can be said that cases of needle breakage will be low during knitting.

Number of fabric defects:

Majority of the respondents were of the opinion that there will be fewer cases of fabric defects during knitting. Apart from this, significant Z values ($P \leq .05$) calculated for comparison between low and high/ medium also reveal that number of fabric defects will be low during knitting.

It was suggested that if suitable machine gauge was employed for knitting, number of fabric defects will not pose any adversity. Other than this, since neps can be observed both as defects or decorative feature by the consumer, suitable market segment should be targeted. Besides this, end product should be suitable to the existence of decorative neps. It was advised that the fabric will be a good deal for export business.

Ease of handling:

High number of respondents (73.33% for fabric S_1, 70 % for fabric S_2, 73.33 % for fabric S_3 and 63.33 % for fabric S_4) advised fabric will be easy on handling, however neps should be taken care of. When not in use, the yarn cones and fabrics should be kept covered to avoid rubbing or friction. Since Z values calculated for comparison between high and medium/ low were found to be significant ($P \leq .05$), it can be said that fabric will ne easy to handle.

Table 3: Distribution of respondents according to their opinion on probability of fabric defects during knitting				(n=30)
Fabric	No. of respondents based on their opinions on fabric defects			Z value
	High (f)	Medium (f)	Low (f)	
S_1	2 (6.67)	11 (36.67)	17 (56.67)	4.75*
S_2	3 (10.00)	9 (30.00)	18 (60.00)	4.38*
S_3	2 (6.67)	11 (36.67)	17 (56.67)	4.75*
S_4	2 (6.67)	10 (33.33)	18 (60.00)	4.75*

f- Frequency, Figures in parentheses indicate percentages
*Significant, Z value for differences of two proportions at one tail and 5 per cent level of significance

Table 4 : Distribution of respondents according to their opinion ease of handling				(n=30)
Fabric	No. of respondents based on their opinions on ease of handling			Z value
	High (f)	Medium (f)	Low (f)	
S_1	22 (73.33)	3 (10.00)	5 (16.67)	3.65*
S_2	21 (70.00)	5 (16.67)	4 (13.33)	4.02*
S_3	22 (73.33)	5 (16.67)	3 (10.00)	4.38*
S_4	19 (63.33)	4 (13.33)	7 (23.33)	2.92*

f- Frequency, Figures in parentheses indicate percentages
*Significant, Z value for differences of two proportions at one tail and 5 per cent level of significance

Table 5 : Distribution of respondents according to their opinion on ease of finishing				(n=30)
Fabric	No. of respondents based on their opinions on ease of finishing			Z value
	Good (f)	Fair (f)	Poor (f)	
S_1	25 (83.33)	5 (16.67)	0 (0.00)	5.48*
S_2	25 (83.33)	4 (13.33)	1 (3.33)	5.11*
S_3	24 (80.00)	5 (16.67)	1 (3.33)	5.11*
S_4	25 (83.33)	3 (10.00)	2 (6.67)	4.75*

f- Frequency, Figures in parentheses indicate percentages
*Significant, Z value for differences of two proportions at one tail and 5 per cent level of significance

Ease of finishing:

Majority of the respondents (83.33 %) for fabric S_1 perceived that there will not be any problem in finishing of fabrics. Similar responses were documented for fabrics S_2, S_3 and S_4 with per centage of 83.33, 80.00 and 83.33, respectively. Apart from this, Z values calculated for comparison between good and fair/poor were found to significant at 95 per cent confidence level. Although the price of finishing may rise because of the presence of neps, it was advised that neps can be removed if required during finishing.

Ease of sewing / linking:

Findings in Table 6 reveal that majority of respondents (73.33 % for fabric S_1, 70.00 % for fabric S_2, 66.67 % for fabric S_3 and 73.33 % for fabric S_4) were of the opinion that there will not any problem in sewing or linking of the fabric during garment construction. Z values calculated for comparison of high

and medium / low were also found to be significant.

Production cost:

A high number of respondents (46.67 %) for fabric S_1 visualized that production cost was high as should be controlled for commercial fabrication. For fabrics fabric S_2, S_3 and S_4, 43.33 per cent, 43.33 per cent and 40.00 pe rcent of respondents, respectively suggested that the cost was high. Apart from this, Z values calculated for comparison of high and medium/ low was not found to be significant. Since fabric was sampled for present study, and various trials were made before actual fabric construction, the cost rose towards higher side. The cost of production is expected to reduce by almost 20-30 per cent for commercial production.

Visual impact:

Knitted fabrics were found very good in terms of visual impact by large number of respondents. Majority

Table 6 : Distribution of respondents according to their opinion on ease of sewing/ linking				(n=30)
Fabric	No. of respondents based on their opinions on sewing /linking			Z value
	High (f)	Medium (f)	Low (f)	
S_1	22 (73.33)	5 (16.67)	3 (10.00)	4.38*
S_2	21 (70.00)	4 (13.33)	5 (16.67)	3.65*
S_3	20 (66.67)	4 (13.33)	6 (20.00)	3.29*
S_4	22 (73.33)	5 (16.67)	3 (10.00)	4.38*

f- Frequency, Figures in parentheses indicate percentages
*Significant, Z value for differences of two proportions at one tail and 5 per cent level of significance

Table 7 : Distribution of respondents according to their opinion on production cost					(n=30)
Fabric	Production cost (Rs.)	No. of respondents based on their opinions on production cost			Z value
		High (f)	Appropriate (f)	Low (f)	
S_1	Rs. 1825.473	14 (46.67)	14 (46.67)	2 (6.67)	0.37
S_2	Rs. 1715.473	13 (43.33)	15 (50.00)	2 (6.67)	0.73
S_3	Rs. 1825.473	13 (43.33)	14 (46.67)	3 (10.00)	0.73
S_4	Rs. 1715.473	12 (40.00)	14 (46.67)	4 (13.33)	1.10

f- Frequency, Figures in parentheses indicate percentages
*Significant, Z value for differences of two proportions at one tail and 5 per cent level of significance

Table 8 : Distribution of respondents according to their opinion on visual impact				(n=30)
Fabric	No. of respondents based on their opinions on visual impact			Z value
	Very good (f)	Good (f)	Fair (f)	
S_1	26 (86.67)	4 (13.33)	0 (0.00)	5.48*
S_2	25 (83.33)	2 (6.67)	3 (10.00)	4.38*
S_3	25 (83.33)	1 (3.33)	4 (13.33)	4.02*
S_4	27 (90.00)	2 (6.67)	1 (3.33)	5.11*

f- Frequency, Figures in parentheses indicate percentages
*Significant, Z value for differences of two proportions at one tail and 5 per cent level of significance

of the respondents (86.67 % for fabric S_1, 83.33 % for fabric S_2 and fabric S_3 and 90.00 % for fabric S_4) liked the look of fabrics. Presence of neps was majorly received as a decorative feature and was appreciated. Since Z values calculated for comparison between very good and good/ fair were found to be significant (P≥05), it can be said fabrics were visually appealing.

Handfeel of fabrics:

Table 9 elucidates the opinions of respondents related to handfeel of blended knitted fabrics. A high majority (93.33 %) of respondents perceived that fabrics S_1 and S_2 were soft when touched. In case of fabric S_3 and fabric S_4, 90.00 per cent and 86.67 per cent of the respondents, respectively were of the opinion that handfeel of fabrics was soft. Apart from this, Z values calculated for comparison between soft and harsh/ fuzzy were found to be significant (P≤.05), it can be said that fabric was soft to touch.

Fabric performance for clothing construction:

Regarding fabric performance for garment construction, 90 per cent of respondents suggested that fabric S_1 was suitable for garment construction and will be viable for its use in the category. A high number of respondents (86% for fabric S_2, 76.67 % for fabric S_3 and 80.00 % for fabric S_4) felt that the fabrics can be seen finding a good place in fashion business and were appropriate for export as well. Apart from this, Z values calculated for comparison between high and medium/ low were found to be significant (P≤.05), it can be said that fabric was appropriate for clothing construction.

Saleability:

The opinions of experts regarding saleability of blended knitted fabrics have been furnished in Table 11. Majority of the respondents (80.00 %) were of the view that fabric S_1 was highly saleable. Similar opinions were recorded for fabrics S_2, S_3 and S_4 with a high per centage

Table 9 : Distribution of respondents according to their opinion on handfeel of fabrics (n=30)

Fabric	No. of respondents based on their opinions on handfeel			Z value
	Harsh (f)	Soft (f)	Fuzzy (f)	
S_1	1 (3.33)	28 (93.33)	1 (3.33)	4.75*
S_2	2 (6.67)	28 (93.33)	0 (0.00)	4.75*
S_3	0 (0.00)	27 (90.00)	3 (10.00)	4.38*
S_4	3 (10.00)	26 (86.67)	1 (3.33)	4.02*

f- Frequency, Figures in parentheses indicate percentages
*Significant, Z value for differences of two proportions at one tail and 5 per cent level of significance

Table 10 : Distribution of respondents according to their opinion on fabric performance for clothing construction (n=30)

Fabric	No. of respondents based on their opinions on fabric performance			Z value
	High (f)	Medium (f)	Low (f)	
S_1	27 (90.00)	2 (6.67)	1 (3.33)	5.11*
S_2	26 (86.67)	4 (13.33)	0 (0.00)	5.48*
S_3	23 (76.67)	7 (23.33)	0 (0.00)	5.48*
S_4	24 (80.00)	4 (13.33)	2 (6.67)	4.75*

f- Frequency, Figures in parentheses indicate percentages
*Significant, Z value for differences of two proportions at one tail and 5 per cent level of significance

Table 11: Distribution of respondents according to their opinion on saleability during knitting (n=30)

Fabric	No. of respondents based on their opinions on saleability			Z value
	High (f)	Good (f)	Low (f)	
S_1	24 (80.00)	3 (10.00)	3 (10.00)	4.38*
S_2	19 (63.33)	4 (13.33)	7 (23.33)	2.92*
S_3	25 (83.33)	1 (3.33)	4 (13.33)	4.02*
S_4	24 (80.00)	2 (6.67)	4 (13.33)	4.02*

f- Frequency, Figures in parentheses indicate percentages
*Significant, Z value for differences of two proportions at one tail and 5 per cent level of significance

of 63.33 per cent for fabric S_2, 83.33 per cent for fabric S_3 and 80.00 per cent for fabric S_4. Since Z values calculated for comparison between high and good/ low were found to be significant ($P \leq .05$), it can be said that fabric had high saleability. Appealing visual impact and texture of fabrics was found to be the reason for high saleability. Huge acceptance for knitted fabrics was foreseen especially for fall winter season.

Conclusion:

Results revealed that blended knitted fabrics were highly production feasible. Parameters like visual impact, handfeel, fabric performance for clothing construction and saleability scored positive opinions as well.

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