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Review Article

A Case Study of Knowledge Gap Analysis of Ginners in Punjab, Pakistan

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Adeel Ahmad [1,*], Chris O. Igodan [2], Kathy Lechman [2,] Maryam [3]
[1]Faculty of Agriculture & Veterinary Sciences, Superior University Lahore, Pakistan
[2]Agricultural Communication Education and Leadership, Ohio State University, USA
[3]Department of Botany, The Government Sadiq College Women University Bahawalpur, Pakistan

*Corresponding Email: adeelformnite@gmail.com
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Abstract
This study addresses the knowledge gaps among ginners and also seeks to bridge them. Few studies have been undertaken in the ginning sector, especially in Punjab, Pakistan. It is pertinent to indicate that ginning industries are at the central place in the cotton value chain. The cotton ginning sector has suffered in the last few years. Ginning out Turn (GOT) is very low in Pakistan as compared to other countries. The existing ginning technology is obsolete and often results in the deterioration of fiber length during ginning. Improving the knowledge, skills, and attitudes of the individuals involved in the cotton ginning sector will not only benefit the industry itself but also strengthen its forward and backward connections through the provision of effective extension services. A random sampling technique was used to determine the sample size. The study included only 50 ginners. An interview schedule was prepared to collect the data. The collected data were analyzed by using SPSS. Results showed that ginners had knowledge gap in assessing quality characteristics of cotton, managing operations involved in ginning process, management of problems, labor management, up gradation of machinery, business competitiveness, quality management, marketing strategies, knowledge of government policies, promotion of institutional linkages, transportation, storage, capacity of losses management, sources of information, packing and acquisition of technical expertise.
Keywords: Ginning, Knowledge gap, Value chain, Cotton, Awareness level.

Introduction

The ginning process represents the second key point in the cotton value chain. It is pertinent to mention that ginning factories occupy a vital position in the cotton value chain (Muhammad, 2021). According to CABI South Asia (2008), ginning factories serve as the primary clients of the cotton growers, providing the essential raw material to the textile, clothing, and oil industries, while the livelihoods of millions of people in Pakistan are intricately dependent on the performance of this sector. After the farmers harvest the cotton crop, it is transported to the ginning mills, either directly or through commission agents, for further processing—the ginning industry serves as a crucial link between cotton-producing farmers and textile manufacturing mills. The cotton ginning stage has a pivotal role in defining the quality of the raw material supplied to the textile and apparel industries. The process of ginning processes the harvested cotton into cotton lint and seeds.

Cotton is ginned to separate it into three primary components: cotton lint, seed, and the waste cotton. According to Baffes (2001), the lint constitutes approximately 30.0-35.0% of the harvested cotton. Cotton seeds are used to produce oil and seed cake, while cotton lint serves as the primary raw material for the manufacture of clothing and textile products. Currently, approximately 5000 oil mills operate across the country (SMEDA,

2006). A typical seed cotton yield of 52,000 kg includes about 17,200 kg (100 bales) of cotton lint, 32,240 kg of seed, and 2,560 kg of residual trash (Altaf, 2008). Thus, lint makes up 33.0%, seed 62.0%, and a large bulk of trash 5.0%. Most cotton waste is used as a substrate for mushroom cultivation. A significant portion of cotton lint and wastes is consumed domestically, while the remaining batches are exported. In 2005-2006, ginning, processing, and baling contributed only 4.60% to the total value added by the textile sector, whereas the textile manufacturing (including spinning and weaving) accounted for 88.04%, apparel weaving for 5.38%, and footwear for 1.98%. These figures clearly indicate the substantial potential for further value addition in cotton and textile industries. PCGA (2017) reported that only 82.0% of the ginning industries were currently operational, of which around 81.0% were in the Punjab province while about 19.0% in the Sindh Province.

With the decrease in production of cotton by about 27.83% in 2016, the cotton ginning sector has suffered badly. It contributes 2.32% in value added agriculture and displayed a negative progress of 21.26% compared to 7.24% in 2015 (GOP, 2017). There is no definitive agreement exists regarding the exact number of the operational ginning factories in the country. The existing 1221 ginning factories in Pakistan have a combined installed capacity of 20 million bales per three shift operation (GOP, 2016). At present, a number of the ginning factories are non-operational because of the technical and financial constraints. Present ginning sector was mainly developed under the second five-year plan in the early 60s under the loan provided by industrial development bank in 1962 (CABI, 2008).

Year	Cotton Ginning
2009-10	7.29
2010-11	-8.48
2011-12	13.83
2012-13	-2.90
2013-14	-1.33
2014-15	7.24
2015-16	-21.26

Figure 1. Growth percentages (Pakistan Bureau of Statistic, 2017)

Ginning out Turn (GOT) is the yield of cotton lint obtained during ginning, and, compared to India and the USA, it is notably lower in Pakistan. In 2003, ginning outturn (GOT) was 34.0% in Pakistan, 42.0% in India, and 37.0% in the USA. Over the past few years, Pakistan's Ginning Output Ratio (GAR) has remained largely stagnant, with minimal improvement. Whereas, in India, the ratio rose from 31.0% in 1960 to 42.0% in 2003. In the 1960s, the GOT ratio was higher than India's; however, by 2003, it had declined to 81% of India's (UNCTAD, 2005). Nonetheless, certain countries, such as Uzbekistan, have a GOT ratio lower than Pakistan's (Baffes, 2005).

The existing ginning technology is outdated and tends to damage fiber length during processing. Additionally, it fails to remove trash efficiently and lacks a moisture regulation system, leading to excessive heating of the cotton (EDB, 2017). Ginning industries do not have updated machinery; they also use outdated ginning methods (Salam, 2008). These industries are unable to keep pace with rapidly changing international standards (Altaf, 2008). Numerous ginning factories in Pakistan lack pre-cleaners, lint cleaners, or automatic pressure devices. Pakistan has the substandard ginning technology in the world (Dawn, 2017). Only 10.0% of the ginning mills are equipped with lint cleaning equipment (Altaf, 2008). Inferior and outdated ginning methods negatively affect the cotton quality.

Power shortages are another serious issue faced by ginning units. This is causing frequent breakdowns and disruptions in production, resulting in higher production costs. Furthermore, banks are lending to the sector at very high interest rates, resulting in borrowing difficulties; as a result, the industry is deprived of valuable investment (CABI, 2008). There is a dire need for extension services to provide a basis for marketing their crop

and product without involving middlemen. The livelihoods of millions in Pakistan are closely tied to the ginning sector. Enhancing the knowledge, skills, and attitudes of individuals in the cotton ginning sector will not only benefit the industry but also increase the value of forward and backward linkages, particularly through the provision of extension services specifically in the cotton marketing chain.

Materials and Methods

District Bahawalnagar is one of the thirty-six districts of Punjab, Pakistan and it was selected purposively as study area. District Bahawalnagar is further subdivided into five sub-districts (Tehsils) i.e. Bahawalnagar, Haroonabad, Chishtian, Minchinabad and Fort Abbas. To select the sample size, a list of all ginners was obtained from APTMA (All Pakistan Textile Mills Association). This list served as the sampling frame and a foundation for random selection. From each tehsil, five ginning industries were selected at random, and from each ginning industry, two respondents were chosen at random, yielding a total sample of 50 ginners. An interview schedule was used as a research instrument to collect data. The objectives of the study were kept in view while developing the Interview schedule. Before final data collection, the interview schedule was pre-tested on ten ginners other than the sampled ginners. Content and face validity of the instrument were determined through consultation with a panel of experts, including two Professors and two Assistant Professors from the Institute of Agriculture. Extension and Rural Development, and one Associate Professor from the Department of Agricultural Marketing and Business, University of Agriculture, Faisalabad. The interview schedule was administered via face-to-face interviews. The collected data were analyzed through the Statistical Package for Social Sciences (SPSS). Descriptive statistics, such as frequency, mean, standard deviation, and percentages, were calculated to illustrate the data. The knowledge gap was determined by subtracting the obtained mean value from 5. Five refers to the 5-point Likert scale used to assess the extent.

Results and Discussion

Demographic Attributes

Age is an essential factor in the attainment of skills by ginners. Increased age leads to increased experience, which ultimately results in improved skills (Aslam, 2010). Education is a process of bringing desirable changes in human behaviour. It is an essential factor in the development of ginners' skills in quality management and cotton marketing (CABI, 2008). Business experience is also a necessary factor in developing ginners' skills. The productivity of human resources is an essential factor in the skills development of individuals across industries.

Table 1. Distribution of the Ginners according to their Demographic Attributes

Age	Categories	Frequency	Percentage
	Up to 25	5	10.00
	25-35	12	24.00
	36-45	13	26.00
	46-55	15	30.00
	Above 55	5	10.00
Educational Level	Illiterate	4	8.00
	Primary	4	8.00
	Middle	6	12.00
	Metric	7	14.00
	Intermediate	12	24.00
	Bachelors	9	18.00
	Masters	5	10.00

	Above masters	3	6.00
	Total	50	100%
Business Experience of Ginners	Less than 5	12	24.00
	5-10	16	32.00
	11-15	11	22.00
	16-20	6	12.00
	Above 20	5	10.00
Ginning Capacity	>200,00	18	36.00
	200,01-300,00	12	24.00
	300,01-400,00	10	20.00
	40001-500,00	6	12.00
	Above 500,00	4	8.00
Status of productivity of Human Resources	Very Poor	9	18.00
	Poor	13	26.00
	Intermediate	11	22.00
	Satisfactory	8	16.00
	Good	6	12.00
	Very Good	3	6.00

Table 1 indicates that about one-third (30.00%) of the respondents were in the “46-55 years” age category. The smallest age categories were the “Up to 25 years” (10.00%) and “Above 55 years” (10.00%). It appeared that more than half of the respondents associated with the study are in the middle age (36-55 years) category—the respondents' increased age results in greater experience and skill. About one-fourth of the respondents (24.00%) had completed schooling up to matriculation. The smallest educational categories were “Above Masters” (6.00%) and “Masters” (10.00%). About one-tenth (8.00%) of the respondents were illiterate, meaning they were unable to read or write. Levels of education are synchronized stages in the education system. As respondents' educational levels increase, their ability to analyze and adopt new techniques also increases. As a result, respondents' skill level in cotton marketing is enhanced. The highest category (32.00%) of the respondents belonged to “5-10 years” category of business experience. The smallest business experience category was “Above 20 years” (10.00%). Less than one-third of the respondents in the study had 5-10 years of business experience. Business experience is so necessary because greater experience reduces the skills gap. It appeared that most of the respondents (36.00%) were in the “Less than 20000 Maunds/day” category of ginning capacity. The smallest size of unit category was “Above 50000 Maunds/day” (8.00%). It appeared that more than one-third of the respondents in the study had a ginning capacity of 20,000 Maunds/day. The highest frequency (26.00%) among respondents was in the “Poor” category of human resource productivity status. The smallest category of human resource productivity status was “Excellent” (6.00%). It appeared that one-fourth of the respondents associated with the study are in the poor category of productivity of human resources.

Quality Characteristics of Cotton

Knowledge and awareness of the assessment of cotton's quality characteristics are essential for its quality management. The government has recognized the need to incorporate quality considerations into the marketing system and has introduced a grading system for cotton (Malik, 2003).

Table 2.Awareness Level of the Ginners regarding Assessment of Quality Characteristics of Cotton.

Quality Characteristics of Cotton	Weighted Score	Possessed Level	Required Level	Standard Deviation
Fiber Length	115	2.30	2.70	1.32
Uniformity of Length	113	2.26	2.74	1.29
Fiber Strength	111	2.23	2.77	1.22
Fiber Fineness	120	2.40	2.60	1.48
Color	205	4.11	0.89	1.16
Trash	199	3.98	1.02	1.35
Fiber maturity	119	2.38	2.62	1.44
Elasticity	117	2.34	2.66	1.40
Hygroscopicity	118	2.39	2.61	1.37

1=V. Low, 2=Low, 3=Moderate, 4=High, 5=V. High

Table 2 shows that the majority of respondents had low awareness of the quality parameters of cotton. The most enormous awareness gap was found for "Fiber strength" (Required knowledge=2.77, standard error=1.22), a cotton quality parameter. The smallest awareness gap was found for "Color" (Required knowledge=0.89, standard error=1.16), a quality parameter of cotton. It appeared that the majority of the respondents associated with the study had an awareness gap regarding fiber strength. The data reveals that respondents have an awareness gap regarding the quality parameters of cotton, which results in low cotton quality in Pakistan and low returns. In Pakistan, trash quantity is 5.00% which is considered high. The results of the study do not align with those of Aslam (2010).

Awareness Level of the Ginners regarding Operations involved in Ginning Process

Different operations are involved in the ginning process, and the awareness level of ginners regarding those operations is fundamental towards quality management of cotton and efficiency of the ginning process. The data on ginners' awareness of the operations involved in the ginning process are shown in Table 3.

Table 3.Awareness Level of the Ginners regarding Operations Involved in Ginning Process

Operations involved in Ginning Process	Weighted Score	Possessed Level	Required Level	Standard Deviation
Grading	137	2.74	2.26	1.45
Pneumetatic conveying	121	2.42	2.58	1.41
Preliminary cleaning	115	2.30	2.70	1.58
Saw gin	126	2.52	2.48	1.43
Lint cleaner	109	2.18	2.82	1.59
Pre-bale press	127	2.54	2.46	1.35
Cotton bales	135	2.70	2.30	1.37
Pressing	134	2.68	2.32	1.36

1=V. Low, 2=Low, 3=Moderate, 4=High, 5=V. High

Table 3 shows that the lowest awareness levels of ginners were found in "lint cleaning" and "preliminary cleaning" as operations involved in the ginning process. The highest awareness level was found in grading, cotton bales preparation, and pressing. It appeared that the ginner respondents had an average level of awareness regarding various aspects of the process. The results of the study are inconsistent with those of CABI South Asia (2008).

Awareness Level of the Ginners regarding Machinery Up-gradation

Upgraded machinery results in increased ginning capacity, better quality, and decreased health issues for workers. The data on ginners' awareness of machinery upgradation are shown in Table 4.

Table 4. Awareness level of the ginners regarding machinery upgradation.

Machinery Up-gradation	Weighted Score	Possessed Level	Required Level	Standard Deviation
Rotobar gins	99	1.97	3.03	1.37
Saw gins	130	2.60	2.40	1.45
Double roller gins	107	2.14	2.86	1.39
To control dust	110	2.20	2.80	1.62
Conveyer belt	129	2.58	2.42	1.45
Sangli machine	142	2.84	2.16	1.35

1=V. Low, 2=Low, 3=Moderate, 4=High, 5=V. High

Table 4 shows that lowest awareness level was found in upgradation of "rotobar gins" and "double roller gins". The highest awareness level was found in up-gradation of "sangli machine" and "conveyer belt". It appeared that awareness level of the ginner respondents was below moderate level in up-gradation of machinery. Upgraded machinery results in increased ginning capacity, better quality and decreased health issues for workers. The results of the study are not in line with those of Aslam (2010).

Awareness Level of the Ginners regarding Assessment of Sources of Advances in Business Competitiveness

There are different strategies or sources for advances in business competitiveness. Weighted score, possessed level, required level and SD were calculated using the collected data related to awareness level of the respondents regarding assessment of sources of advances in business competitiveness which are depicted in Table 5.

Table 5. Awareness level of the ginners regarding assessment of sources of advances in business competitiveness

Sources of Advances in Business Competitiveness	Weighted Score	Possessed Level	Required Level	Standard Deviation
Saving of power cost	147	2.94	2.06	1.43
Saving of manpower cost	102	2.04	2.96	1.53
Saving of capital cost	140	2.80	2.20	1.34
Fiber friendliness machinery	127	2.54	2.46	1.45
User friendliness machinery	92	1.84	3.16	1.38
Higher length of fibers	132	2.64	2.36	1.35
Enabling of Oil Crushing of Cotton Seed without	117	2.33	2.67	1.34

Delinting				
Retaining of natural luster and moisture	81	1.61	3.39	1.45
Lower neps contents	79	1.58	3.42	1.34
Extra cleaning	112	2.23	2.77	1.36

1=V. Low, 2=Low, 3=Moderate, 4=High, 5=V. High

Table 5 reflects that lowest awareness level of the ginner respondents was found in "lower neps contents" followed by "retaining of natural luster and moisture" and "use of user-friendly machinery" as sources of advances in business competitiveness in ginning process. The highest awareness level was identified in "saving power cost" after "saving of capital cost" and "higher length of fibers". The respondents' awareness level regarding the use of "fiber-friendly machinery" as a source of advances in business competitiveness was moderate. The results of the study are not consistent with those of Aslam (2010) due to the different methodology.

Awareness Level of the Ginners regarding Marketing Strategies for Ginned Cotton

The ginners need to be aware of different strategies for cotton quality management. Depending upon the collected data related to awareness level of the respondents regarding marketing strategies for ginned cotton, weighted score, possessed level, required level, and SD were calculated, which are presented in Table 6.

Table 6. Awareness level of the ginners regarding marketing strategies for ginned cotton.

Marketing Strategies	Weighted Score	Possessed Level	Required Level	Standard Deviation
Company's broacher for promotional activities	79	1.87	3.13	1.57
Knowledge about market needs	87	1.74	3.26	1.48
Marketing related problem management	106	2.12	2.88	1.44
Fetch better market price	117	2.27	2.73	1.36

1=V. Low, 2=Low, 3=Moderate, 4=High, 5=V. High

Table 6 shows that the most significant awareness gap among the ginner respondents was in "knowledge about market needs" as a marketing strategy. The smallest awareness gap was seen in "fetching better market price". It appeared that the respondents had the second-lowest awareness gap regarding the preparation of the company's brochure for promotional activities. The respondents' awareness of the management of marketing-related problems was found to be low. The results of the present study are not in line with those of Muhammad (2013).

Awareness Level of the Ginners regarding Policies

The government and ginning associations have established policies for managing the ginning process. Some of those policies are pro-industry and helpful for ginners to enhance their businesses, such as environmental sustainability, worker safety measures, industrial growth, and market awareness. Some policies are developed to monitor various standards in the ginning industry, such as licensing and auditing of machinery. The higher awareness among the ginner respondents of these policies may lead to increased competitiveness. Weighted score, possessed knowledge, required knowledge, and SD were calculated using the collected data related to the respondents' level of awareness regarding various policies, which are presented in Table 7.

Table 7.Awareness level of the ginners regarding policies.

Policies	Weighted Score	Possessed Knowledge	Required Knowledge	Standard Deviation
Pro-industry Policies	131	2.62	2.38	1.33
Anti-industry Policies	133	2.66	2.34	1.35
Suggested Policies by the Ginners	135	2.69	2.31	1.35

1=V. Low, 2=Low, 3=Moderate, 4=High, 5=V. High

Table 7 shows that the highest possessed knowledge of the ginners was identified regarding "suggested policies by the ginners". The lowest possessed knowledge of the respondents was identified regarding "pro-industry policies," followed by "anti-industry policies," which were known to the respondents to an average extent. The results of the study partially agree with those of Muhammad (2013).

Awareness Level of Ginners regarding Institutional Linkages

There are some organizations or associations, like PCGA (Pakistan Cotton Ginners Association), that are established to facilitate ginners in raising their community voice and developing standards & strategies. Based on the data collected on respondents' level of awareness regarding institutional linkages, weighted scores, possessed knowledge, required knowledge, and SD were calculated and are depicted in Table 8.

Table 8. Awareness level of ginners regarding institutional linkages.

Institutional linkages	Weighted Score	Possessed Knowledge	Required Knowledge	Standard Deviation
Membership of Ginneries with Associations	163	3.26	1.74	1.36
Facilities provided by PCGA	159	3.17	1.83	1.45
Raising of Community Voice by PCGA	129	2.58	2.42	1.34
Website of PCGA	116	2.32	2.68	1.51
Visit of the Website	106	2.11	2.89	1.37
Usefulness of Website	104	2.08	2.92	1.41

1=V. Low, 2=Low, 3=Moderate, 4=High, 5=V. High

Table 8 shows that the highest level of awareness among the ginner respondents was regarding "membership of ginneries with associations" as an institutional linkage, followed by "facilities provided by PCGA". The lowest awareness level of the respondents was identified in the "usefulness of website" as institutional linkage after website of PCGA. It appeared that the awareness level of the respondents regarding "raising of community voice by PCGA" was at a moderate level. The results of the study are partially supportive of those of Irfan (2013) who found that ginners have a lower level of knowledge regarding institutional linkages.

Awareness Level of the Ginners regarding Functions of Agricultural Marketing

Ginners should be well aware of the various functions of agricultural marketing to succeed in their business. High awareness of the functions of agricultural marketing may lead to higher credit returns for respondents. Depending upon the collected data regarding awareness level of ginner respondents regarding functions of agricultural marketing, weighted score, possessed level, required level and SD were calculated, which are depicted in Table 9.

Table 9. Awareness level of the ginners regarding functions of agricultural marketing.

Functions of Agricultural Marketing	Weighted Score	Possessed Level	Required Level	Standard Deviation
Assembling	192	3.84	1.16	1.55
Grading	121	2.42	3.58	1.56
Processing	160	3.20	1.80	1.40
Warehousing	163	3.26	1.74	1.52
Packaging	156	3.12	1.88	1.41
Distribution	149	2.97	2.03	1.24

1=V. Low, 2=Low, 3=Moderate, 4=High, 5=V. High

Table 9 shows that the lowest awareness level of the respondents was found in "grading" as a function of marketing followed by distribution. The highest awareness level was found in "assembling" as a function of agricultural marketing. It appeared that awareness level regarding processing, warehousing and packaging was ranked above average. The results of the study do not align with those of Aslam (2010).

Conclusions

Ginners had knowledge gaps in assessing the quality characteristics of cotton, obtaining price information, managing operations involved in the ginning process, managing problems, upgrading machinery, improving business competitiveness, quality management, marketing strategies, understanding policies, promoting institutional linkages, and acquiring technical expertise. A cotton quality management system should be established to maintain cotton quality. Ginners should buy cotton directly from cotton growers. Marketing conditions should be improved to ensure the smooth, proper marketing of cotton without damaging it. Proper cotton storage facilities should be ensured so that cotton can be stored properly. Institutional linkages of the ginning industries should be established with different associations. Policies regarding marketing of cotton should be developed. Technical knowledge should be provided to ginners to manage different operations involved in ginning. Proper transportation means and packing material should be used. Ginning machinery should be upgraded to latest. Availability of electricity should be ensured. Ginners should be forced to give incentives for better quality of cotton. Price premium should be provided for better quality of cotton.

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