

VALUE CHAIN ANALYSIS OF COTTON: OPPORTUNITIES AND CHALLENGES

ABSTRACT:

Aim: To identify the main chain actors involved in value chain of cotton and assess their linkage, roles and responsibilities in the value chain and to map the complete value chain of cotton from producers to consumers.

Methodology: Descriptive statistics mainly value chain analysis is used to map the generic value chain of cotton. The required primary data about the movement of cotton along the length of the value chain were collected from different stake holders of the value chain through pretested questionnaires by employing personal interview method.

Result: It was found that value chain of cotton includes many stakeholders like input suppliers, producers, intermediaries, processors like ginners, spinners, weavers, dyers and printers and garment manufactures, playing their respective role in the value chain

Conclusion: Cotton crop undergoes multistage processing at the industrial level and it has very complex value chain involving multiple stake holders. Cotton has enormous potential as a source of raw materials for the textile industry. However, the low productivity, which is primarily the result of suboptimal farming practices, limits the total expansion of the cotton business. There is a need to set up a common platform which engage all stakeholders from farmer to consumers and to strengthen the value chain of cotton by easing logistics facilities.

Key words: Cotton, Value chain, Intermediaries, Processing, Stakeholders and Logistics

1. INTRODUCTION

Cotton is one of the most important industrial fibre crops across the world (Kumar *et al.*, 2019). It has its significance in both primary and secondary sectors by providing substantial employment opportunity to both skilled and unskilled workers (Sankar and Naidu, 2017). Being cultivated in more than 150 countries the crop occupies 32.91 million hectares with the production of 26.58 million tons (Beeraladinni *et al.*, 2016). India leads the globe in terms of cotton production and area. According to Cotton Corporation of India, it provides roughly 40% and 24%, respectively, to the world's cotton production and area. In India, Telangana, Gujarat, and Maharashtra were the three states that produced the most cotton. The third-largest cotton producer is Telangana, with second largest area under the cotton among the cotton growing states in India. Cotton is grown extensively in Nalgonda, Adilabad, Nagarkurnool, Sangareddy, Kumuram Bheem, and Rangareddy districts and the best long staple cotton is grown in the state of Telangana. The Nalgonda district recorded the highest production of 6.24 lakh bales with 2.85 lakh hectares. Adilabad ranked second in production with 4.59 lakh bales from an area of 1.72 lakh hectares. (Planning Department, Government of Telangana's state statistical abstract, 2020-21).

1.1 Value Chain Analysis

A value chain is an array of tasks carried out by a business to add value for its customer base. A value chain is a systematic corporate strategy for taking a good or service from its inception to consumption. A value chain's ultimate objective is to provide a business a competitive edge by boosting productivity while minimizing expenditures (Porter, 1985).

1.2 Modules in Value Chain

A value chain divides a company's activities into primary and support activities. Inbound logistics, operations, outbound logistics, marketing, sales, and services are the five main components of primary activities, all of which are crucial for enhancing value and gaining a competitive edge. Support activities' purpose is to increase the effectiveness of the primary activities. It consists of infrastructure, technology development, human resource management, and procurement. (Promee *et al.*, 2021).

1.3 Role of Value Chain in Agriculture

A value chain in agriculture refers to the group of people and processes that move a basic agricultural product from its place of production to its point of consumption and adding value to the product along the way. Globalization of agricultural markets is resulting in new consumption patterns as well as new production and distribution networks. Consequently, value chain analysis is crucial to agriculture. (Sarma and Ali, 2018)

2. METHODOLOGY

2.1 Sampling design

Combination of purposive and multistage random sampling technique was employed for the selection of districts, mandals, villages and different stakeholder in value chain. Adilabad and Nalgonda districts were selected for the study on the basis of highest cotton production and concentration of the processing units. Two mandals, one mandal with high production and another with low production were selected under each district. Under each mandal two villages were chosen with the same criteria. From each selected village, 15 farmers were selected randomly to collect the needed primary data. Information regarding the marketing intermediaries were obtained from the sample of 10 traders/commission agents and 10 CCI agents. Data regarding the processing of cotton were gathered from a sample of 10 ginning mills, 10 spinning mills, 10 weaving mills, one dyeing and printing mill and one garment manufacturing unit.

2.2 Value chain analysis

Mapping a value chain is the visual representation of the connections between the actors and tracing the product flow through an entire channel from the point of production to the point of consumption. It includes the following steps.

- a) Identification of the core processes in the value chain.
- b) identifying the major players in the value chain and their contributions to value addition.
- c) Mapping the flow of the product along the value chain.

3. RESULTS AND DISCUSSION

A value chain mapping is carried out to comprehend the various stakeholders, how they are interconnected, and how each plays a specific role. The actors of the value chain, their roles, and linkages were shown in the format of figure. The value chain includes numerous operations, including preproduction (supply of inputs), industrial processing, and marketing of finished items to consumers (Devi *et al.*, 2017).

The basic cotton value chain map is shown in Fig. 1, it represents the various actors involved in the cotton value chain. Based on information gathered from various value chain stakeholders, the map was generated. The value chain map is divided into two sections, the left side shows the essential pre-harvest steps, while the right side shows post-harvest logistics. Arrow marks on the map are used to indicate the movement of the produce. The

figure has been organized into four sections for ease of use: input logistics, production, marketing, and processing.

3.1 Input logistics

Input logistics mainly dealt with the accessibility of input from their production point to the farmers. Input logistics involves a large number of players who were crucial to the transportation of inputs in this study region. Seed producing companies like Rasi Seeds Private Limited, Mahyco Private Limited, etc., fertilizer manufacturing companies like Coromandel International Limited, Paradeep Phosphate Limited, etc., pesticide manufacturing companies like Insecticides India limited, Karnataka Agro Chemicals, etc., were involved in the production of seeds, fertilizer and pesticides respectively. From these companies, inputs like seeds, fertilizers and pesticides were reached to input dealer shops like Istakameshwara Swami Fertilizer, Pesticides and Seeds and Sri Venkateshwara Sai Fertilizer Limited through companies' distributors. These input dealers supply seeds, fertilizers and pesticides on credit basis to the farmers at time of necessity. It was noticed that cotton production is dominated by the private seeds, fertilizers and pesticides. Farm machinery manufacturers like Mahindra Group and Swaraj Company supply farm machinery and implements through dealers in turn they provide repairing and other services.

One of the farmer's main inputs during the production activity is credit. It enables them to purchase needed inputs and adoption of modern technologies. Formal credit is supplied by the financial organization like Andhra Pradesh Grameena Vikas bank and Telangana Grameena Bank and informal credit is supplied by the private money lenders and input dealers. The needed technical advice for cultivation of cotton is provided by office of KVKs, agricultural universities and Department of Agriculture, through agriculture officers and agriculture extension officers. Although cotton is rainfed crop, cultivated during Kharif season in the Telangana state whenever, the rainfall is not adequate farmers supplement irrigation through borewells, canals and open wells. Labor is the most essential factor in the growing of cotton. Cotton being a labor-intensive crop needs more number labor for sowing, application of plant protection chemicals and fertilizers, weeding operations and cotton pickings. Most of labour in cotton cultivation are casual labours arranged by the contractors.

3.2 Production

The farmers carry out tasks of production to produce the cotton. Farmers were a significant player in the value chain, performing crucial roles, right from procurement of the input from input dealers till marketing of the produce. Production activities like preparation of land, seed sowing, fertilizer application, inter cultivation operation, pests and diseases management, irrigation and harvesting of seed cotton etc., were undertaken by the farmers. It was observed that majority sample farmers in the research area were growing long staple cotton varieties due to their high yielding nature and better price in the market.

Seed cotton is also called as kapas it encompasses cotton fibre and cotton seeds along with the trash such as leaves, stems, bracts and immature and unopened bolls. The trash content in the seed cotton ranges from 4-6 per cent (Patil and Arude, 2015). This seed cotton was bagged and then marketed to the intermediaries like traders or Cotton Corporation of India and Farmers occasionally sold their goods directly to ginning mills in the area.

3.3 Marketing

During cotton marketing, intermediaries like traders/commission agents play an important role. They perform the role of price determination, cleaning and separation of foreign material like bracts, leaves, stems and immature and unopened bolls (Devi *et al.*, 2017). They purchase the seed cotton from the cultivators at their farm gate and put up for sale in the local ginning mills/ginning mills in other cities/ ginning mills in the other states. During the survey period 2021-22 traders were active as there was a hike in the price of kapas which exceeds the MSP announced by the Government.

The Cotton Corporation of India Limited or CCI is the primary organization of Government of India. price support operations were taken by CCI, whenever the prices of seed cotton fall below the Minimum Support Price fixed by Government of India. CCI purchases cotton from the farmers in the notified ginning mills or in notified APMC market yards. After

purchasing CCI delivers the kapas to the ginning units for processing. It provides processing cost to the ginners and sell the lint to spinning mills. CCI has three branch offices in Telangana namely Adilabad, Warangal and Mahabubnagar. In the survey period 2021-2022, the cotton prices were more than the MSP therefore the role of CCI was minimal.

3.4 Processing

Cotton processing is a complicated process. The cotton underwent a lengthy processing before it was ready to be sold to customers as a finished good. For easy understanding, processing is discussed under four separate headings like primary, secondary, tertiary processing and finished product manufacturing.

3.4.1 Primary processing

It is the first stage of processing of cotton where seed cotton processed in to lint. It primarily takes place in ginning mills.

a. Ginning mills

The primary processing of the cotton takes place in the ginning mills. These mills play a very important role in separation of cotton fibre from the cotton seeds and this process is called as ginning. Ginning mills acts as a connective bridge between cotton farmers and textile industry. The extracted fibre in the ginning process is called as lint. The percentage of lint recovery from the kapas is called as ginning out turn ratio which is approximately 33 %. The lint extracted during ginning finds its route to spinning mills in the state or in other states like Maharashtra, Karnataka, Tamil Nadu and Andhra Pradesh or to the bleaching units for further processing, sometimes these transactions are mediated by the commission agents. Ginning mills may also export the lint to other countries directly or they sell to the exporters who involved in exporting business. During the ginning process 65 per cent of seeds is recovered from the kapas. That will be sold to nearby oil mills for cotton seed oil extraction.

3.4.2 Secondary processing

Secondary processing takes place after the primary processing, the products (cotton seed and lint) obtained in the primary processing were further processed in oil mills, spinning mills and in bleaching units.

a. Oil mills

The oil mill utilizes the cotton seed for the extraction of cotton seed oil and cotton seed cake. Normally cotton seed yields nearly 12 percent of cotton seed oil and 86 percent of cotton seed cake and remaining 2 per cent is the wastage. The cotton seed oil extracted in the oil mills is called as crude oil. The crude oil is sold to oil refineries for further purification. Cotton seed cake sold to the dairy units from there it reaches to the farmers, where it is majorly used as feed for adult animals or as a manure.

b. Spinning mills

Majority of the lint obtained from the primary processing undergoes spinning. Spinning is the following step of value addition to the cotton fibre after ginning. It is the significant and crucial stage of processing of textile products. Where yarn is obtained from lint. The process involves procuring bale cotton (lint) from the ginning units or from Cotton Corporation of India and process it through a series of spinning machines to produce yarns of the required counts. The final product is the cone with yarn wound on it, weighing 1.8-2 kg. (cottoncounts.net). These cones are then packed and dispatched directly to the weaving units in the state or to the other states. these transactions were mediated by the commission agents also. Spinning mills also export the cotton to the other countries or sent to the exporter who involved in exporting of yarn and some quantity of yarn will be sent to yarn wholesalers who

involved in the business of wholesaling of different kinds of yarn like cotton, polyester, rayon yarn, etc. During spinning process, on an average one quintal of lint yields 75 per cent of first grade yarn and 25 per cent of yarn waste *i.e.*, second grade yarn.

c. Bleaching units

Some of the lint from ginning mills finds its route to bleaching units for further purification. Cotton, like all other natural fibres, has some natural colouring matters, which impart a yellowish-brown colour to the fibre. The bleaching intended to confer a white appearance to the fibre by removing the impurities and colouring materials along with increase in whiteness, bleaching results in complete removal of seed husks and trash and increases the absorbency of the fibre. The most regular bleaching agent used for this purpose is hydrogen peroxide in the view of its superiority over other bleaching agents (Oliveira *et al.*, 2018). Bleached cotton will be sold to medical or cosmetic industry or directly exported to other countries.

3.4.3 Tertiary processing

Tertiary processing occurs after secondary processing. Final products (yarn and crude oil) obtained in secondary processing were further processed in the oil refineries and weaving mills.

a. Weaving mills

After spinning, weaving is the third stage of value addition, the oldest way of turning yarn into cloth. Either contemporary power looms or classic handlooms are used for weaving. Despite the fact that contemporary techniques are more intricate and swifter, the fundamental idea behind interlacing yarns has not altered. The warp or lengthwise yarns that are used in weaving provide the fabric's framework. They typically demand a higher level of twist before weaving the width-wise interwoven strands known as weft (cottoncounts.net).

During weaving one quintal of yarn can yield 97 kg of fabric and remaining 3 kg is wastage. Fabric produced in the weaving mills called as greige fabric, will be sent to the dyeing mills for further processing. Fabric produced in the handloom weaving units will be sold to either wholesalers or handloom weavers cooperative society in the villages. From them it reaches to retailers or exporters. Finally, it reaches the consumers via retailers.

b. Oil refineries

Crude oil obtained from the oil mills during the secondary processing will reach to oil refineries where degumming, neutralization, bleaching, deodorization of crude oil will take place to remove the impurities such as free fatty acids, phospholipids, pigment and other toxic elements like gossypol to make cotton seed oil edible. Refined cotton seed oil is pale yellow colour and contains large quantity of linolenic acid. It is considered as the world's best edible oil and heart oil as it is free from cholesterol. It is the 2nd major source of vegetable oil throughout the world (Sharif *et al.*, 2019). Refined oil from the refineries moved to wholesalers then to retailers and finally to consumers of cotton seed oil.

3.4.4 Finished product manufacturing

Finished Product manufacturing, take place after tertiary processing. Here, product obtained in the tertiary processing (greige fabric) were further processed to form finished good. It takes place in the dyeing mills and garmenting industries. where the final products like finished fabrics and readymade garments were produced and supplied to the consumer through wholesalers and retailers.

a. Dyeing mills

The second last stage of the cloth manufacturing process is dyeing and printing, which takes place in dyeing mills. Dyeing and printing mainly focusses on colour and appearance of the textile. Dyeing is an activity of imparting colour to the cloth after weaving. Textile printing is a technique of complementing the fabrics with designs and patterns. After printing, finishing of fabrics need to be done, it is an operation that improvises the appearance and usage of the fibre (textileinfomedia.com). After finishing, the cloth will be sent to either garmenting industry to manufacture the readymade apparel or to wholesalers. From the wholesalers, it reaches to retailers and finally to the consumers.

b. Garment manufacturing units

Garment production is a structured activity that include the steps like laying, marking, cutting, stitching, checking, finishing, pressing and packaging, where fabric is converted to various forms of garments. Cotton garment can be used in every type of clothing such as shirts, trousers, dresses, jackets denims, kurtas, skirts, *etc* (cottoncounts.net). To make one piece of shirt, 1.4-to-2-meter cloth is needed along with the other raw materials such as thread, button and fusing materials. After garmenting, the finished product (garments) is supplied to wholesales, then it reaches retailers and finally to the consumers. Small scale garmenting industries sell the finished products directly to the consumers.

UNDER PEER REVIEW

4. CONCLUSION

Value chain analysis of cotton was carried out at four different level. It was identified that cotton chain composed of many stakeholders and the linkages among the stakeholders is complicated involving many intermediaries. Value chain was discussed in four stages, input logistics deals with input manufacturing and its distribution until it reaches the farmers. Production stage involves cultivation of cotton by the famers. Cotton being commercial crop grown by the farmers of all land holding size. Marketing of cotton involves intermediaries like commission agent/traders and Cotton Corporation of India which involved in price support operation. Processing of cotton takes place at 5 different level namely ginning, spinning, weaving, dyeing and printing and lastly garment manufacturing. At each stage of processing cotton changes its form and finally reaches to consumers in the farm of textile.

As it was noticed that expense of cultivation is rising due to insect pest invasion and yield getting reduced due to unpredictability of the monsoon are the major concerns of the farmers. It is essential to develop location specific varieties suitable for that particular area. Cotton seed oil and cotton seed cake were not popular among the consumers therefore, there is an opportunity for enterprise development in this area to reap the grater benefit. It is also clear that the value chain of the cotton is complex and lengthier, a common platform would be created by the government like CCI which can play special role in enabling the all actors from the farmers to the consumers to interact, share their common concern and strengthen the linkage between them so as to trade without the mediation of the brokers or commission agents.

COMPETING INTERESTS DISCLAIMER:

Authors have declared that they have no known competing financial interests OR non-financial interests OR personal relationships that could have appeared to influence the work reported in this paper.

REFERENCES

AbdElrazig HE, Musa MI and Elsheikh SE. Value Chain Analysis for Tomato Production and Marketing in Khartoum State, Sudan. *Current Investigations in Agriculture and Current Research*. 2018;5(4):651-657.

Alam MM. Value Chain Analysis of High Value Crop: Farm to Market. *International Supply Chain Technology Journal*. 2020;6(5):1-11.

Kumar MA, Dey G and Mukhopadhyay S. Economics of Cultivation of Cotton in Adilabad District of Telangana State. *Journal of Pharmacognosy and Phytochemistry*. 2019;8(6):2037-2041.

Sankar AS and Naidu V.B. To Study the Cost, Returns and Profitability of Cotton Production in Andhra Pradesh. *International Journal of Advanced Education and Research*. 2017;2(3):28-32.

Beeraladinni D, Lokesha H and Wali V. Dimensions of Growth and Development of Cotton in India: An Economic Analysis. *Ecology, Environment and Conservation*. 2016;22(2):801-807.

Cotton Corporation of India Limited. Current cotton scenario. 2020-2021. https://cotcorp.org.in/current_cotton.aspx

Hambisa EN, and Geda MB. Analysis of Soybean Value Chain in Buno Bedele Zone, South Western Ethiopia. Ethiopian Journal of Environmental Studies & Management. 2019;12(5):509 – 519.

Planning Department, Government of Telangana. Telangana state statistical abstract. 2020. https://www.tsdps.telangana.gov.in/Statistical_Abstract_2020.pdf

Porter, M. E. Competitive Advantage. Free Press Pvt. Ltd. New York. 1985, 192-195.

Promee AT, Auntu SK, Sharmin A and Ayon AC. Exploring Traditional Handloom Value Chain and Its Sustainability Constraints in Bangladesh: A Qualitative Study on Tangail Handloom Industries. Journal of Business and Economics. 2021; 2:252-264.

Sarma PK, and Ali MH. Value Chain Analysis of Tomato: A Case Study in Jessore District of Bangladesh. International Journal of Science and Research. 2018; 8(2):924-932.

Devi IS, Suhasini K and Prabhakar BN. Value Chain of Groundnut- An Analysis of Constraints and Opportunities Ahead. Indian Journal of Economics and Development. 2017;13(1):769-775.

Devi IS, Suhasini K and Vasudev N. Value Chain Mapping of Maize in Ranga Reddy and Mahaboobnagar Districts of Andhra Pradesh. The Andhra Agricultural Journal. 2013;60(4):915-920.

Patil PG and Arude UG. Recent Advances in Cotton Ginning Technology in India. Central Institute for Research on Cotton Technology, Mumbai, India., 2014; 1-12.

Cotton Counts. Cotton: From Field to Fabric. <https://cottoncounts.nl/>.

Oliveira BP, Moriyama LT and Bagnato VS. Colorimetric Analysis of Cotton Textile Bleaching through H₂O₂ Activated by UV Light. Journal of Brazilian Chemical Society. 2018; 29(6):1360-1365.

Sharif I, Farooq J, Chohan SM, Saleem S, Kainth RA, Mahmood A and Sarwar G. Strategies to Enhance Cottonseed Oil Contents and Reshape Fatty Acid Profile Employing Different Breeding and Genetic Engineering Approaches. Journal of Integrative Agriculture. 2019; 8(10):2205–2218.

Textile Informedia, Dyeing Process – A Process of Providing Colours to Fabric by Textile Dyeing. <https://www.textileinformedia.com/blog/dyeing-process-a-process-of-providing-colors-to-fabric-by-textile-dyeing/>