

## **SUPPLY CHAIN MANAGEMENT OF PULSES (CHICKPEAS) INDUSTRY IN INDIA**

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***Abstract:** Supply Chain Management gains more importance due to changes in factors like information technology, competition, importance of speed and the human aspect. The paper discusses the practical issues in terms of the drivers of the supply chain performance, which are inventory, transportation, facility, information and price of the upstream elements, farmers, traders and mid stream firm millers, gram processors of the supply chain. A particular supply chain is taken for the study for the agro commodity product chickpea in TamilNadu. This article critically reviews the scenario of agro commodity supply chain management in India by throwing a light on prevailing market place for agriculture products, APMC, Millers, Processors and Information Technology.*

***Key words:** Supply chain management, information technology, drivers, commodity, chickpeas, agro commodity*

### **INTRODUCTION**

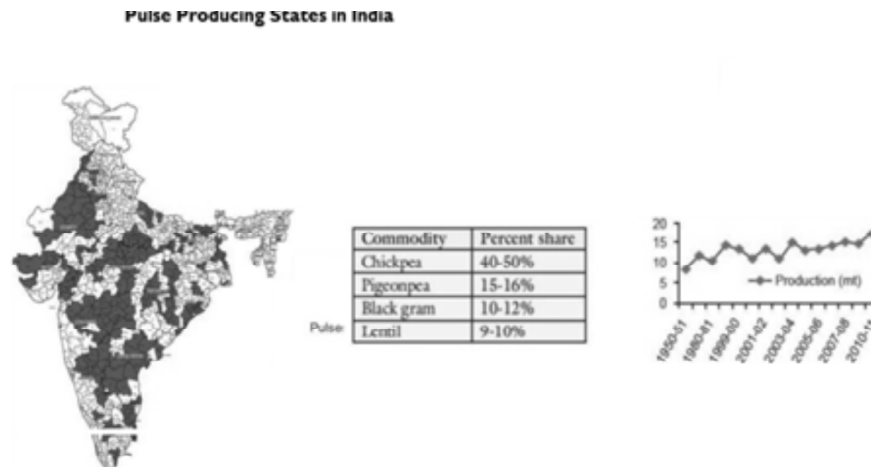
In world, India is the largest producer, consumer, importer and processor of pulses. The pulses are grown by 171 countries. The total area under pulses was 723 lakh hectares. The highest area was contributed by India 32.24% (2010-2011). The contribution to total production by India was 23.46% to 28% next Canada 7.93% and China 7.09% and is recognised globally as a major player in pulses. (Source: Status Paper On pulses, Govt of India Ministry of Agriculture). India grows a variety of pulse crops under a wide range of agro-climate conditions. It grows about eight types of pulses, the major ones are Gram, Pigeonpea, Lentil, Fieldpeas etc. Pulses are a major and cheap source of plant protein and carbohydrates. Among all the pulses chickpea (also called as channa, gram dal, Bengal gram) continues to be the largest consumed pulse and comprises of 40-45% of the total pulse production in India. The contribution of chickpea to total area was 35% in 22 states and 2 UTs. The major chickpea producing states fall in the central and west region of India such as Madhya Pradesh, Maharashtra, Uttar Pradesh, Rajasthan, Karnataka and Andhra Pradesh. Looking at the demand and supply scenario

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the demand is higher than the domestic production and has to import from other countries for additional requirement such as Australia and Burma. For the triennium ending 2010-11, the domestic consumption of pulses in India was 186.5 lakh tonnes. Against this, India produced an average quantity of 158 lakh tonnes. During this period, there was a gap of 28.5 lakh tonnes of pulses in demand and supply. This gap was due to higher growth of population as compared to pulse production.



Source: Directorate of Economics and Statistics (DES), Department of Agriculture & Cooperation (DAC) and Department of Commerce (DoC)

Export basket of pulses shows Chickpeas is the leading pulse export contributing around 90 percent during 2012-13 and 2014-15. Import of chickpeas is from Australia (61.43%), Russia (22.77%), Tanzania (7.84%), Myanmar (6.40%), USA (0.47%). EXPORT Pakistan (29.93%), Turkey (18.11%), Algeria (17.24%), Sri Lanka (5.34%), U Arab EMTS (4.43%). Although it is the world's largest pulses producer, India has been importing 3-4 million tons (MT) of pulses every year to meet its domestic demand. However, during the last decade, growth in pulses production has increased significantly. India achieved a record output in pulses production at 18.1 MT in 2010-11 with an all-time high production achieved in chickpea (8.25 MT), moong (1.82MT) and urad (1.74 MT). Even though pulses production increased significantly during the last decade, continuing the faster growth is a bigger challenge for researchers, extension agencies and policy makers.

The existing traditional agro commodity supply chain is highly inefficient, fragmented and not systematic comprising of farmers, traders, middleman, agents, millers, gram processors who are the influential supply chain players or elements. There is a need to analyze these existing agro commodity supply chain at the operational level so that a solution can be derived in the future. The factors influencing the current traditional supply chain are the actual production of the commodity,

imports of pulses from other countries, no transparency in the demand and supply situations among the upstream and downstream elements of the chain, logistics, price fluctuations, too many middleman who manipulate the information creating fake demand, they also reduce the supply chain profitability because of the margins incurred by them.

### Supply Chain Management

Industrialized agriculture has embraced new technology and management procedures such as supply chain management. Agro commodity supply chain spans from farmers to customers. The nature of agro commodity supply chain is a highly variable, high risk, low margin, seasonal and uncertain market environment. The real measure of supply chain success is how well activities are coordinated across the supply chain to create value for consumers, along with increasing the profitability of every link in the supply chain. Supply-chain management (SCM) is 'the management of the entire set of production, distribution, and marketing processes by which a consumer is supplied with a desired product'. Supply chain management is the integrated process of producing value for the end user or ultimate consumer. SCM is a philosophy for integrating all the activities in the life of a product or a service from the earliest source of raw materials to the ultimate customer, and beyond to disposal. A supply chain is "an integrated process wherein number of various business entities work together in an effort to acquire raw materials, convert these raw materials into specified final products and deliver these specified final products to retailers.

### Analysis of Individual Elements of Existing Chain and Their Influence on the Major Drivers a typical Agro commodity Supply Chain in India.

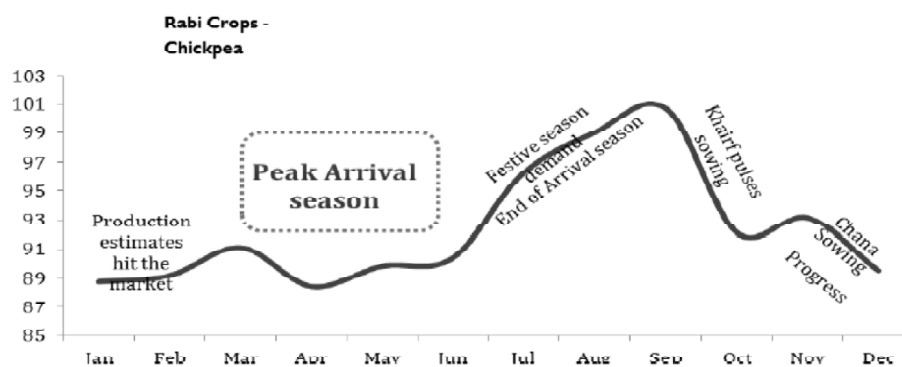
Figure 1



### Farmers

The farmer farm size is small and fragmented. The farmers bring their produce in small quantities in Gunny bags fifteen days after harvest of chickpea. The chickpeas are grown as rabi crops which do not depend on monsoon for cultivation. The yielding season is shown in the figure 2. During January new crops are harvested. Most of the farmers are small (1.5 ha average holding). They bring their produce in small quantities. Fifteen days after the harvest it is brought to the nearby government Mandy, APMC

Figure 2



Commodity Analysis: Page no. 1 to 5, Introduction to commodity: page no. 6 to 9

### APMC

*Agricultural Produce Market Committee* is a marketing board established by state governments of India with all the required infrastructure such as storage, marketing platform, weighing facility etc. APMC acts run on two principles: Ensure that intermediaries (and money lenders) do not compel farmers to sell their produce at the farm gate extremely low price so that farmers are not exploited. All food produce should first be brought to the market yard and then be sold through auction.

Under APMC Acts: A State is geographically divided and Market (Mandis) are established at different places within the states. Farmers have to sell their produce through the auction in Mandy. To operate in Mandy, a trader has to get license. Wholesale, retail traders (e.g. shopping mall owner) or food processing company etc cannot buy farm output directly from farmer. They've to get it through the Mandy. There are many problems faced by farmers due to the restrictions imposed by APMC Act. Even after receiving the produce, they delay payment to farmers for weeks and months. If payment is done on spot, then trader would arbitrarily deduct some amount, on excuse that he has not received payments from the other parties. To avoid taxes, the traders don't give sale slips to farmers. As a result, later it is difficult for farmer to

prove his 'income' to get loans from banks. on an average basis the farmer is able to receive barely 1/4th to 1/3rd of the final retail prices.

**Aggregators:** The *aggregators* purchase small quantities maximum 1 to 2 tonnes from farmers through the middleman and make it into bulk quantities starting from 100 tonnes and more. Depending upon their potential. The produce is weighed and the quality is assessed by the buyers. The intermediaries or the middle man do the negotiations on price, quality and fix a price where both will agree. This process takes place before cash is handed over to the farmers. The traders thus buy small quantities and aggregate them. The product is stored in the **god owns** provided by the APMC or their own godowns. These products have a limited shelf life as they are agro products. The traders use traditional preserving procedures. They hold the stock until they get good rates. Most of the time they speculate increase in price and hold the stock for long time. This leads to shortage of goods in market leading to artificial demand and wastage due to damage of raw material.

**Intermediaries:** The main objective of marketing is to create valuable exchanges between consumers and producers. The market consists of those consumers who are willing and able to purchase products, hence creating exchanges that satisfy both parties. There are four main types of intermediary: agents, wholesalers, distributors, and retailers. A firm may have as many intermediaries in its distribution channel as it chooses. It can even have no intermediaries at all, if it practices direct marketing.

**Middlemen**, also referred to as intermediaries, play a vital part in ensuring that the distribution channel between the producer and the consumer is complete. The more the intermediaries in the supply chain, the higher the distribution channel. It can even have no intermediaries. It can even have no intermediaries at all, if it practices direct marketing. But in this case middlemen get double commission (both from seller and buyer) thus makes consumer to pay for this spread. Also middlemen do not pass the benefit to either side during peak season, when they buy from farmer at low prices; they don't drastically reduce the prices to final consumer. during lean season, when consumer's prices are high, the farmers do not get higher returns on their produce.

**Agents or Brokers** are individuals that act as an extension of the manufacturing company. Their main job is to represent producer to the final user in selling the product. They do not own the product directly; they take possession of the product in the distribution process. They make their profits through fees or commissions. They charge about Rs 3/ bag.

### **Gram Processors or Millers**

They belong to unorganized sector. Manufacturing or gram processing stage which is the midstream of the supply chain and the firms responsible for this are called Millers and Gram Processors.

**Millers:** The millers are small enterprises with capacity of 1000 tonnes. The millers purchase the chickpeas as raw material through the commission brokers, depending on the quantity, quality and price from the local ,domestic or foreign market. There are commission brokers who do the negotiation, place the order, and solve discrepancies if any. The purchased chickpeas are cleaned, coated with 10% water, rolled to remove skin, then it split and dried. These are then packed and distributed to wholesalers to provisional stores, supermarkets and institutional buyers. If millers are located in the same area where the Mandy is situated they have the advantage of buying it directly from market. But for the millers from other states it is not feasible to buy products directly because the millers do not do bulk purchase, their inventory is maximum for ten days consumption. The shelf life of the gram is ten days if kept without drying or heating. For procuring small quantities say 100 to 500mts value 300000/- to 600000/- it will not be possible for them to travel and do the direct purchase hence they depend on agents. This habit over a period of time makes them move away from the actual market. They do not have any idea about the prevailing market, demand or supply which gives way to speculations. The buyer's only source of information is agent communication.

**Gram Processors:** There are about minimum 100 small and large scale manufacturers of "Roasted Gram" in Tamil Nadu. A small percentage of the total chickpeas production about 10% is roasted called the "roasted gram". In this process it is processed in various stages and final outcome is called roasted gram. It is directly consumed as snacks or further processed for "Sattu" or nutritional protein biscuits or snacks. The chickpea becomes a value added product. There is lots of time, skill involved in the process. This process improves the shelf life, taste and usability of the product for various purposes. It in airtight bags it can be stored for fifteen days. This is the general procedure for other agro commodities also.

## SUPPLY CHAIN PERFORMANCE

For a supply chain to be efficient for agro commodity product is keep the supply at lowest cost ,maximize performance at lowest cost, lower margins, high utilization of manufacturing process to keep cost low, minimize inventory to lower cost, reduce wastage, select buyer based on cost and quality.(Source: What is right supply chain for your product?, MarshallL Fisher, HBR, 1997. **Supply chain performances**, how the company can achieve the balance between responsiveness and efficiency in its supply chain that best meets its competitive strategy. The five major drivers of the supply chain performance are information, facility, inventory, transportation which comes under non- financial performance measure and price which is one of the financial measures. The major drivers of Supply Chain Performance are as follows and are discussed in a critical manner. The study is narrowed from agro commodity to pulses industry to chickpeas industry.

**Inventory** is all the raw material, work in progress and finished goods within the supply chain. For an efficient supply chain the inventory policy should be low. The

inventory purchasing pattern is just- for- need, with a minimum buffer of ten days requirement. Due to high price fluctuations the manufacturers are apprehensive to stock more inventories. Starting from the farmers, after the harvest the farmers dry the yield for minimum 15 days before bringing to the market. This produce is called "raw chickpeas". Next the aggregators, stock their products for not more than ten days with proper facility. Once they get an order, they pack as 100kg bags and send it to the millers, gram processors or for export. After aggregators next comes the millers in the supply chain who stock raw materials, the finished goods such as dal, dal flour. The husk, damaged broken gram and waste are other things they stock. The percentage of dal obtained after processing is 75-80%. The remaining 25-20% is husk, broken and moisture. The inventory in work-in-progress is 20 quintals per hour for stage one processing, 15 quintals per hour for stage 2 processing and 10 quintals /hr for roasting gram.

**Facilities** are the places for storage, packing, production and processing. The decisions regarding these will have significant impact on the supply chain performance. The raw material is moved from the warehouses to buyers directly. The buyers could be in the close by locations or very far of place. In case of Tamil Nadu the raw material, chickpeas are moved from states like Maharashtra, Madhya Pradesh, Karnataka and Andhra Pradesh. Only In recent days due to agri technology there has been production in southern states like Andhra Pradesh and Karnataka. This has made a big change in the buying behavior of the most southern states like Tamil Nadu. It has become cheaper and easy. The imported channa are purchased from private parties or from Government institution. Gulabi and desi type channa are preferred for roasting purpose. The storage facility has to be free from dampness, pest and rodents, they chickpea has the property to attract rats and beetles. Solar heat treatment, non-chemical fumigation, biogas treatments, neem smoke treatment are some methods used for preserving. Once the grams are purchased the moisture content is removed in two ways .One is just by passing through the blowers or fans it gets dried externally. This way the grams nature does not change and is suitable for splitting grams into dals. The dals can be used for cooking purpose directly. Or the dal is ground into flour and used as ingredients. Second method of preserving is by passing the grams through the oven and it is slightly heated. By doing this the grams property changes because it gets slightly cooked with the existing moisture. This is then kept open for one full day to allow the steam to evaporate it is made to wait for minimum 7 days before it is taken for the second stage and this method is followed for roasting purpose this. These are then packed in airtight bags. As the harvest is only during January and February for the rest of the year these grams have to be stocked.

**Milling:** The process of dehusking, subsequent splitting of cotyledons, its cleaning, polishing and grading is called milling. In this processes there is avoidable waste of 10-15% taking place due to improper milling technique and quality of the chickpeas. Flouring is the process of grinding the dal obtained after milling.

**Roasting:** The process of roasting, dehusking, splitting, cleaning, grading is the gram processing. The time taken for gram roasting is eleven days or the total cycle time taken for roasting and to get finished product is 11 days. The company holds the finished products for a maximum of 3 days in plastic coated gunny bags into different grades for sales. There is value addition in these processes milling, roasting and flouring. These are packed in airtight bags.

**Transportation** involves moving inventory from point to point in the supply chain. It can form many modes and routes each with its own performance characteristics. For efficiency the company can use cheaper ground transportation such as trucks, containers, Lorries or railways such as wagons. Between the fields and the Mandy the farmers use bullock carts, tempos, trucks and tractors at their own expense. Between the traders and the buyers the transportation is only through Lorries about twenty tons per lorry. Usually the suppliers include the shipping cost in the selling price. The buyers stock their inventory in their factories or mills. Buyers are small scale traders. Until ten years ago there was not much of lorries and transportation was through railways. Government allocated wagons for the commodities. Due to shortage Government does not allocate wagons for pulses. This lack of infrastructure burdens the millers and processors to great extend. The transportation charges incurred in lorries is 33% higher compared to wagon. Even though the charges are less there are lots of drawbacks in the railway system which makes the buyers choosing the roadways. If the railway infrastructure is available and reliable then the buyer would choose this mode which has a major cost contribution to the total supply chain profit.

**Information** consists of data and analysis containing inventory, facility, transportation, price and customers as well. Information is potentially the biggest driver of performance in supply chain as it directly affects each of the driver. Information allows coordination between stages and information sharing. It is crucial to daily operation of each stage in a supply chain – e.g., production scheduling, inventory levels, market information etc. It enables in forecasting and aggregate planning. The few enabling technologies are EDI, Internet, ERP systems, and Supply Chain Management software's.

**The information is the weakest drivers** .The buyers lack information about the external market price. The intermediaries give rates convenient to them. Even though the buyers are aware of such thing, they do not have any option than to buy through them. They are also reluctant to rely on the private web portals for market rates. There is wide gap between the information technology and these traders. There are numerous intermediaries, who make up for weak infrastructure, and deliver critical value in each leg at very low cost and their aggregate cost makes the chain uncompetitive. Flow of information and market signals are manipulated so that they are able to extract more profits for themselves than the value they are delivering (Source :@echoupal)The correct information do not reach the farmers because all of them live in hinterlands (600,000 villages) they do not have access to real time information such as prices and



weather. The circumstance of each one is very different in terms of agro-ecological conditions, resources, getting customized knowledge advise on farm practices and risk management becomes a big challenge, further compounded by weak infrastructure – Physical, Social, Institutional. Investing in information technology is not feasible as the firms are low profit and low margin making firms. The cost of investment is as minimum as 3lakhs to 5 lakhs for basic information technology implementation.

**Pricing** determines the amount to charge customers in a supply chain. Pricing strategies can be used to match demand and supply. The Minimum Support Price(MSP) is fixed by the Government. There are middle man who fixes price for the farmers and the bulk consolidators. Even though the prices are fixed by Government as Minimum support Price they do not have bargaining power and due to their own loans and commitments urgency of cash requirement the abide by the middle man.

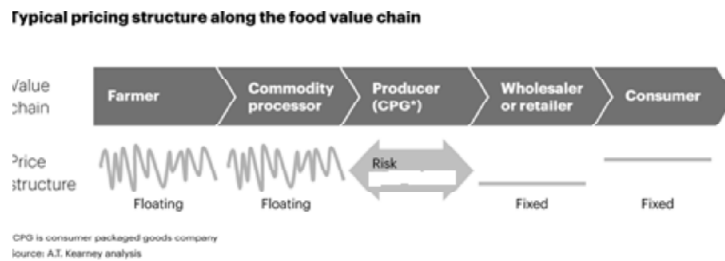
**Minium Support Price (MSP)**

(Unit: Rs/Quintal)

**Table 5**  
**The MSP of pulses for the last 5 years**

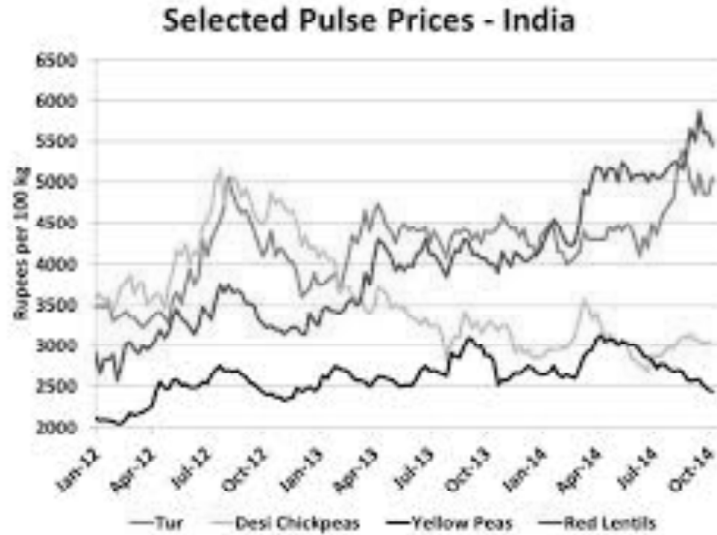
Pulses	2010-11	2011-12	2012-13	2013-14	2014-15
Gram	2100	2800	3000	3100	-

Pricing is another problematic factor in this supply chain. Sustaining in the industry becomes a challenge for these small scale millers and manufacturers as far as any pulses are concerned due to price fluctuation. The main factors which determine the price are total area covered ,arrivals in the markets ,demand from millers, stockiest and retailers, production in the International markets, production and trends of other pulses namely urad and turn in domestic and international markets and price of Yellow Pea and finally Import and export policies by the Indian Govt. This leads to floating price structure in the upstream of the supply chain and fixed in the low stream and a huge risk is involved in this



From the figure it is obvious that the price of desi chickpeas is reduced over a period of two years, this has led to new manufacturers entering the market and selling for less margins which in turn affect the existing manufacturers who sell their products at very less margins making them difficult to sustain.

Figure 3



Procurement of raw material takes place in the following manner. In the actual practice the middleman or the brokers only keep track of the markets and the buyers do not. With the interview done with few manufacturers it was obvious that the buyers don't rely on any other source for knowing the market price. Each and every manufacturer has 2 or more agents. These agents offer rates to the buyers on everyday basis. Keeping the demand, season and comparative rates the buyer decides to buy from any one of the agent. (The agent gets a commission of Rs.3/bag.) There is a big gap of information about price for the manufacturers, Even though there are government organization and private associations who give information about the production, imports and seasons.

## CONCLUSIONS

From this overview it is well understood that there is no integration of the supply chain elements, the elements function discretely interested in their own survival or profit making not ensuring that the customer does not pay excess for the commodity. With proper communication, cooperation and coordination this highly fragmented supply chain can be made into an efficient supply chain. Information technology can play a major role in attaining communication, cooperation and coordination making the supply chains a single entity so that every player gets fair share and need any prerequisite of middle man in the process of procurement. Only organizations like ITC echo pal has succeeded in taking information technology to farmer's level. With the Government's help in building the suitable infrastructure for information technology, could this pulses industry overcome the above mentioned difficulties and

become an efficient supply chain. The railway infrastructure can bring down the cost of transportation by 33%.

### *References*

Agriculture Supply Chain Management: A Scenario in India, Somashekhar I C, Raju, hema Patil, Research scholar Institute of Management Studies.

How ITC leveraged information management thru e-Choupal and transformed the Agri supply Chain By Sachin Sharma ITC Limited.

Supply Chain Management Sunil Chopra.

