International Journal of Multidisciplinary Research and Development
Online ISSN: 2349-4182, Print ISSN: 2349-5979, Impact Factor: RJIF 5.72
www.allsubjectjournal.com
Volume 3; Issue 4; April 2016; Page No. 77-81

Impact of supply chain on agriculture and sustainable livelihood

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Abstract

India being an agrarian economy accounts for almost 14% of the GDP. It provides employment to almost half of the country's population in one form or another. Agriculture is the backbone of Indian economy but unfortunately growing at a rate of only 1.4% during 2012-13 [1] before liberalisation and globalisation of India the demand for agricultural products was inelastic in nature as till 1990 the Indian economy was closed economy and substantial demand for agricultural products of new-born babies occurs after at least five years of their birth. But with the globalisation, urbanisation, income growth and changing consumption patterns, the demand for agricultural products is rapidly growing requiring a much needed impetus to the agricultural sector. Also diversification of demand for agricultural products' is further fuelling the increased demand. Another aspect of economy is that the higher growth rate in secondary and tertiary sectors have increased the income of people employed in the sectors resulting enhancement in their living standard, changes in their taste and preferences toward high quality products, changes in their life style and purchasing behaviour. These changes, globalization and rapidly increasing population pose challenge before the agriculture sector to increase productivity and production as well as create opportunities to people employed in this sector. Hence, the present focus of production and its consumption is shifting towards high-value commodities. There are also some bottle-necks like energy and bio fuels, growing water scarcity and climate change, etc. hindering the supply of agricultural products thereby widening the gap between demand and supply of agricultural products.

This research paper is a careful study of SCM of potato and onion which throws surprising result that it fills the gap between demand and supply of agricultural products aiding to agriculture and creating sustainable livelihood.

Keywords: Supply Chain Management, Agriculture, Sustainable Livelihood
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Introduction

The major population of India is engaged in the profession of agriculture. Since the population of the country is increasing at a rate of 1.7% [2] which is too much for the second largest populous country of the world and land is fixed, small farmers are becoming too smaller to support the livelihood for them and their families sufficiently.

Table 1: Landholding Structure and Irrigation Status in India

Average landholding size (ha)	Holding below (1 ha)	Irrigated area: % of arable land
1.41	61.58%	35.2

Sources: Data are compiled from www.worldbank.org andwww.adb.org for form size and holding.

The average landholding size is 1.41 hectare and 61.58% of landholding is below 1 hectare. Irrigated area is 35.2%. As average farm size and landholding of Indian farmers are small, the productivity per worker of agriculture is low leading to low income and poverty in rural areas.

Table 2: Important Socio-economic Features of India.

Features	Period	India
Per Capita Income (Rs.) (at 2004-05 prices)	2012-13	39,143
Rural Population (in millions)	2012	845.2
Share of agriculture in GDP (%)	2012-13	14.1
Hunger (Malnourished) Population (%)	2006	43.5
Share of Agriculture in Workforce (%)	2012-13	58.2
Poverty (%)	2012	25.7

Sources: data compiled from economic survey 2012-13, http://pib.nic.in/newsite/erelease.aspx?relid=92062 and: http:// indiabudget. nic. in /survey.asp and www.wordbank.org

Agriculture contributes only 14.1 % in GDP but it employs more than 50% of Indian work force. This imbalance need to be corrected to rural population enjoy the fruits of increased growth rate of economy.

Agriculture and sustainable livelihood are interdependent on one another. Agriculture needs inputs like seeds, fertilizers, manures, pesticides, insecticides, machines and labours, etc. generating rural livelihood on the other end. For agricultural inputs, money or income is essential and comes from livelihood. Agriculture being the main source of income and small landholding size the income of rural people is low. Being the low income majority of people of rural area are poor. The major income of poor people is spent on food items leaving

1. Press Information Bureau, GOI, Ministry of Statistics & Programme Implementation, 07-February-2014 17:31 IST
2. http://censusindia.gov.in/2011-prov-results/prov results paper1india.html

them with bare minimum to spend on agricultural inputs and resources causing underdevelopment.

Supply Chain Management (SCM) ties up the agriculture and sustainable livelihood in common thread. Each and every product has its own unique supply chain. Agricultural supply chain is different from industrial supply chain. Effective agricultural supply chain management ensure the right input in right quantity of right quality at right time and at right price ensuring the good production. It provides ample employment in pre and post harvesting, storage and distribution, etc. It generates sufficient income in the process for the work force employed in the agriculture sector.

Agricultural supply chain management

Agricultural supply chain management is basically concerned with agricultural inputs and produce and agro-products. The basic concept of every supply chain remains same but it is some or other ways unique for each and every product depending upon its nature, cost, value, availability and government policies etc. Agriculture has varieties of products that differ in nature, cost, value and durability like vegetables and fish are perishable in nature and have different supply chain as grains. Vegetables need cold storage to be preserved but grains need only warehouses to be preserved.

In agricultural supply chain management backward and forward integration are very important as it provide inputs to farmers and help them in selling their produce in the different Mandies and markets. Backward integration implies the relationship building with different input supplier (seed, fertilisers, manures, pesticides, insecticides, credits, labours, government subsidies, information regarding weather and different crop diseases, etc.). Forward integration is concern with relationship management with different channel partners that help the farmers in selling their produce in different markets at optimum price. The participants in forward integration are adhatiya (middleman), information provider of different markets and their existing prices, wholesalers, retailers and modern retailers like fresh stores, Field Fresh, Choupal Fresh, Choupal Sagar, Adhar and Nature Basket and Global Green, etc.

The basic thrust of supply chain management is to reduce the cost of production while delivering best value to customers and its channel partners and competing with competitors. Supply Chain Management will be as strong as its weakest link. And every link to be strong the backward and forward integration should be strong. So, good relationship management with every stakeholder of supply chain management is of strategic importance as it is a key to success In this research paper, lights have been thrown on agricultural supply chain management with the help of supply chain management of wheat, rice, potato and onion and what impact it has on the agriculture, livelihood and rural development.

Supply chain management

Supply chain of a product refers all links through which the product is transferred to consumer from the producer. In agriculture it connotes a link that take a product from farm to fork. General supply chain of a product includes producer, wholesaler, retailer and consumer. In today's business scenario supply chain management is of strategic importance as each and every business organisation want to spread its operations within and beyond country in which it operating its business and without efficient supply chain management it is impossible to any business doing so.

Emergence of supply chain management

Prior to 1950s, there has been no formal concept or theories of supply chain management but the system was prevalent in the corporate world with no recognition. The second half of the twentieth century witnessed a phenomenal growth and development in the overall concepts and approaches toward it. Supply Chain Management is acknowledged in 1990s.

Global supply Chain Forum of 1996 has defined supply chain management as 'the integration of key business processes from the end user through original suppliers that provides products, services and information that add value for customers.'

Christopher (1992) defines a supply chain as the network of organisations that are involved, through upstream and downstream linkages, in the different processes and activities that produce value in the form of products and services in the hand of ultimate consumers.

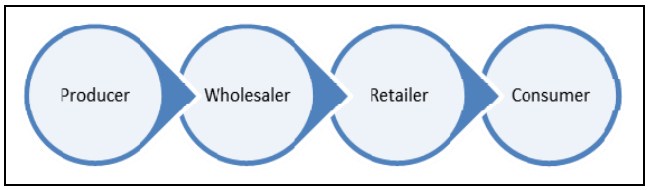

Fig 1: General Supply Chain of a Product

LaLonde and Masters (1994) [5]. Proposed that a supply chain as a set of firms pass materials forward.

The Supply Cain Group at the University of Tennessee (Mentzer, 2000) [6]. Define supply chain management as 'the systematic, strategic coordination of the traditional business functions within a particular company and across businesses within the supply chain, for the purpose of improving the long-term performance of the individual companies and the supply chain as a whole.' Council of Logistic Management (2004) defines supply chain management as something that 'encompasses the planning and management of all activities involved in sourcing and procurement, conversion, and all logistic management activities. Importantly, it also includes coordination and collaboration with channel partners, which can be suppliers, intermediaries, third party service providers, and customers. In essence, Supply Cain Management integrates supply and demand management within and across companies.' Supply chain management is an integrated thread that ties up each and every activities of a business starting from sourcing and procurement, transformation and collaboration with channel partners in such a coordinated manner that every stake holder optimizes its profits while delivering best value to customers at least price.

Supply chain management as an intrinsic tool basic economic activities

Supply chain management resembles to the basic economic activities of the countries of the world. Basic economic activities are production, distribution and consumption in the process it does capital formation, income and employment generation and general supply chain of a product consists of producer, distributor and consumer. In supply chain, products are moved from producers to consumers generating income and employment. Refer figure 2 and 3.

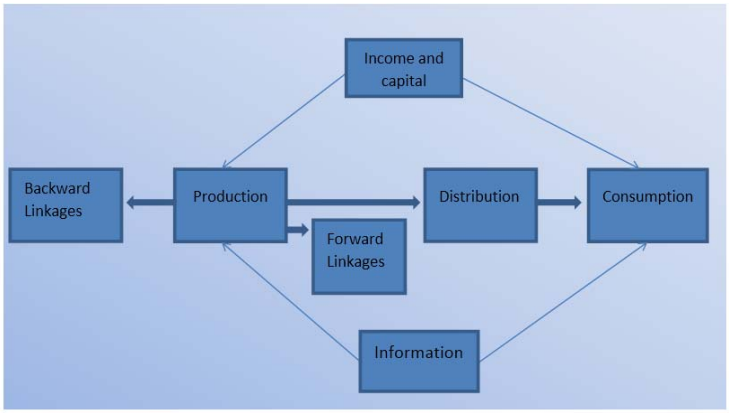

Fig 2: Basic Economic Activities

For the effective completion of this cycle the producer need to have very good and competitive backward and forward linkages. Backward linkages are relationships with raw material providers, searching for new improved sources of raw materials, self-production of raw materials, adopting new and improved techniques and technology in production, using information and computer technology (ICT) in procurement and production, developing better infrastructure and conducting research and development programmes, etc. Forward linkages connotes the relationship management with the different intermediaries and customers, mergers, acquisitions, amalgamations, collaboration, developing better infrastructures, using ICT in distribution order processing and information gathering and creating customer redressal, etc.

In the every stage of the cycle employment is generated for the society and country. Companies or producers pay salary to its employees. Customers pay for products which ensure the income for producers and help them in capital formation and reproduction. Effective and efficient economic cycle create win-win situation for both consumers and the producers. It provides income for producers, employees and government leading to development of companies, people, society and entire nation.

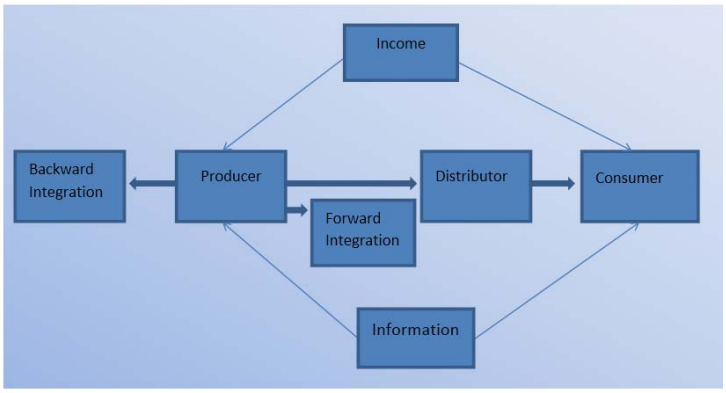

Fig 3: Supply Chain of a Product

Although, the supply chain of every product is unique depending upon its nature, quality, durability and value, etc. but it is more or less same as shown in above figure. As in basic economic activities the origin is production and end is consumption same as in supply chain of a product origin is producer and end is customers. Effective and efficient supply chain management also need backward and forward integrations. Backward integration in supply chain management refers to the good relationships with vendors and raw material providers, searching and developing new sources of raw material and using ICT in procurement, etc. Forward integration implies management of good relationships with intermediaries, using ICT in demand management and order processing, developing warehouses and conducting research and development for betterment of the whole supply chain, etc.

Each and every stage of efficient and effective supply chain management is also creates sufficient employment and income for the people and the society. In the supply chain information cash flow toward the producers so that they may sustain and develop. Both ways basic economic activities and efficient supply chain management income and employment necessary for agricultural inputs and sustainable livelihood are generated.

Supply chain of potato and onion

The stakeholders in the vegetable supply chain are farmers, agents, vendors and modern retailers like fresh stores, Field Fresh, Choupal Fresh, Choupal Sagar, Adhar and Nature Basket and Global Green, etc. As shown in the figure no.4, potato and onion follows four kinds of supply chain.

Supply chain 1 farmers to consumers (F-C)

In this supply chain, farmers themselves bring their produce to retail markets and sell directly to consumers and receive money from them.

Supply chain 2 farmers to mandies to retailers (F-M-C)
In this supply chain, farmers bring their produce to wholesale Mandies where agents help them in selling the produce and take commission on the sale as per the rules and regulation of the Mandi. Agents make payments to farmers after having their commission.

Supply chain 3 farmers to mandi to modern retailers to consumers (F-M-MR-C)
In this supply Chain, produce flows from farmers to consumers via Mandies and Modern Retailers and money is given to the farmers by agents after having their commission on sale of the produce.

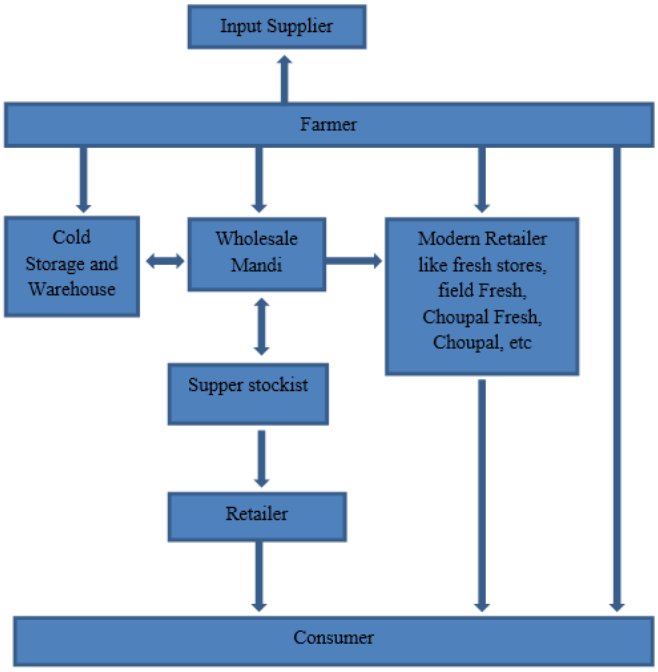

Fig 4: Supply Chain of Potato and Onion in Indi

Supply chain 4 farmers to modern retailers to consumers (F-MR-C)
In this supply chain, Modern Retailer contracts with the farmers to buy their produce at stipulated price. Peasants are provided inputs by Modern Retailers but it is least prevalent in India. Reliance had contracted with farmers to buy the produce directly from them instead of from the mandis. However, this supply chain was very costly and hence they replaced contracting farming with current system to reduce their losses.
One important part in the supply chain of potato and onion is super stockist. Super stockists buy huge quantity of produce during the peak season of potato and onion when these are cheaper in Mandies. They stock it in cold storage and warehouses and bring it into Mandies at the time of shortage of supply to earn more and more profit. In the above mentioned four supply chain of potato and onion second one is the most prevalent in India in the case of vegetables.

Potato supply and demand
Major part of potato production in the country is utilised in domestic use. Exports as a percentage of production have fluctuated but remained at less than 1 per cent over the years (Table 3). For the year 2012–13, the exports are projected to be at 236 thousand tonnes, a modest increase given the increased production for the year.

Table 3: Potato Supply and Demand ('000 tonnes)

Item	2005–06	2006–07	2007–08	2008–09	2009–10	2010–11	2011–12	2012–13
Production	23,905	22,181	28,471	34,391	35,889	42,339	41,568	42,479
Imports	2	0	0	0	0	0	0	0
Total Supply	23,908	22,181	28,471	34,391	35,889	42,339	41,568	42,479
Exports	78	92	82 196	97	174	203	236	
Total Utilisation ('000 Tonnes)	23,829	22,089	28,389	34,195	35,792	42,165	41,365	42,243
Share of Exports to Production (%)	0.33	0.42	0.29	0.57	0.27	0.41	0.49	0.56
Share of Use to Total Supply (%) Domestic	99.67	99.58	99.71	99.43	99.73	99.59	99.51	99.44

Source: Nhrdf & Faostat.
Notes: 1. first advanced estimates 2012-13. 2. Export figures for 2011–12 and 2012–13 are based on a review of recent trends.

Supply and demand of onion
Onion exports account for about 10 per cent of total production. Over the years domestic use has increased relative to exports (Table 4). This reflects a fast growing domestic market. However, there are also policy restrictions on exports: high MEP and the measures to curb exports when domestic

prices flare up. We have projected exports to rise slightly in the year although the overall production may not be much higher than the 2011–12 harvest. Although, this will reduce the domestic utilisation somewhat, but it would still be greater than in 2010–11 and revised estimates for some of the states may raise the output for 2012–13. Our own assessment in the previous quarterly report was production of 16.7 million tonnes which has now been exceeded by the first advance estimates. India is the largest exporter of onion and it is expected to retain this position in the short-term.

Table 4: Onion Supply and Demand (Million tonnes)

Onions	2005–06	2006–07	2007-08	2008–09	2009–10	2010–11	2011-12	2012–13
Production	8.68	8.89	9.14	13.59	12.19	15.12	17.13	16.82
Imports	0.007	0.0	0.0	0.0	0.001	0.005	0.006	0.007
Total Supply	8.69	8.89	9.14	13.59	12.19	15.12	17.14	16.82
Exports	0.96.2	1.38	1.01	1.67	1.68	1.36	1.53	1.63
Total Utilisation	7.73	7.50	8.13	11.92	10.51	13.76	15.61	15.19
Share of Exports to Production (%)	11.08	15.55	11.05	12.30	13.76	9.02	9.39	9.67
Share of Domestic Consumption to Total Supply (%)	88.93	84.45	88.95	87.70	86.24	90.98	90.62	90.33

Source: NHRDF & FAOSTAT. Notes: 1. First advanced estimates.
2. Export projections of 2012–13 based on average trend growth in the recent five years.

Table 5: Food Balance Sheet (thousand tonnes) for 2013–14

Item	Onion	Potato
A. Supply side		
Beginning stocks	757	1,400
Production	18,230	46,200
Imports	10	0
Total supply	18,897	47,900
B. Demand side		
Domestic consumption	17,240	45,200
Exports	1000	250
Utilisation	18240	45450
C. Closing stock	657	2450

Source:http://www.ncaer.org/downloads/Reports/Agriculture-Report_July-Sept%20_%202013.pdf

Conclusion

Potato and onion are such agricultural products that are used by each and every people and section of the society in some or other ways. Going by the above tables, we can easily state that India has been a self-sufficient nation with respect to vegetables. But if we take into consideration the existing levels of poverty and standard of living, we can say that there is a deeper problem lying in the grass roots level which is on the supply side. The production of potato and onion have always been over and above the demand but still a major chunk of Indian population still remains unfed and lacks necessary resources for the same creating an endless chain of poverty and inefficient agricultural processes. The supply side is not very well managed with respect to the above vegetables and requires a proper planning of the characteristic bottlenecks impeding the smooth flow of the important food products. The mismanaged supply side creates an overall imbalance in demand and supply equilibrium. The needy and resource scarce people fail to get the food grain and cereals at a fair price affecting their real income. This further hampers their already existing meagre incomes and ultimate means of livelihood. Hence, there is a clear cut relationship between the supply chain management and sustainable livelihood of the rural people. Hence it is imperative for the government to take necessary actions to improve the supply chain factors to create an indirect and direct betterment in the livelihood of the rural people.

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