

LEVERAGING THE AGRIBUSINESS VALUE CHAINS WITH INNOVATIVE TECHNOLOGY IN DEVELOPING COUNTRIES.

¹Sumira Malik, ²Rajnandini Kumari, ³Sudeep Pathak, ⁴Jaspreet Kaur

¹Assistant Professor, ²PG scholar, ³PG scholar, ⁴Assistant Professor

¹ Department of Agriculture sciences,

¹Shivalik institute of professional studies, Dehradun, India

Abstract: India being world's largest source of scientific manpower requires making remarkable increase in food grains production. However in last two decades agriculture production has remarkable growth rate but this rate is required to be maintained & simultaneously accelerated with other regulating negative factors such as climatic fluctuation in limited time frame & sustainable manner. Agribusiness value chains development & its further development needs to be channelized through outstanding autonomous, unambiguous and well concerted factors. These factors may contribute in enabling Indian agriculture towards better and primary pathway for production of more food to satisfy needs of increasing population, in developing country like India, agribusiness is major factor to motivate large number of farmers and involve new generations into agriculture field with the introduction of "Innovative technology". The innovative technology may help in meeting demand of limited resources such as land manpower, water & energy supply. In this review, we show role of different innovative technology that enhance & assure input supply of Indian farms at appropriate time locates with significant increase in income output. Simultaneously consumers will receive required commodities in expected time frame at reasonable price by satisfying food crisis.

IndexTerms - Agribusiness, Technology, Value chain, India.

I. INTRODUCTION

Agribusiness and technology: FAO proposes that by working upon & developing value chain structure the production of food and sustainable agriculture could be enhanced. This in turn may regulate food crisis improved nutrition with food security involving provide sectors (FAO. 2007, FAO. 2009a, FAO. 2009b, Kumar et al., 2011 and IFC. 2012).

Agriculture value chains and their requirement: Agriculture value chain is a vertical network link among various business organization which involves processing packaging, storage, transportation & commodity distributions (Dunn, 2014). In an Asian country like India under its developing stage, natural or regional agricultural value chain play significant role in economic development by addressing socio-economic problems of food processing farmers & their consumers. The agricultural value chains contribute in regulation of "Rural Poverty" where production to consumption is well managed through processing and marketing. Currently, the Indian agricultural value chain system showed fragmented lack of connecting links among farms & markets with poor investment a failure in the involvement of vulnerable & susceptible groups

Previously at the global level a major thread of serving local & national market has been reported by United Nation conference Table on Technology & Development (UNCTAD).The major reason is lack of cooperation & interest among companies & farmers coordination. The productions of food offered by famous usually failed to satisfy the reliability & good quality traits which are primarily in demand of renowned companies. The farmers also need to develop a direct access and coordination with their consumers so the share of the middlemen can be regulated benefitting farmer & consumer both. Simultaneously farmers can provide high quality produced to their consumers at economic rates. Thus, Indian farmers & consumers require sustainable agriculture value chains making in concerted manner with innovative technology.

The previous studies also reported that modified manufacturing food production practices had contributed through coordinated pattern among farmers processing units, retailers & stakeholders (Kumar et al, 2011). India is known as third agricultural produce after China & USA and still requires enormous development to compete at global level. In spite of being third producer in the world the studies shows that only 4% of fruits are processed comparatively to China (23%) & Brazil (70%) as described in previous reports (Shiva Kumar et al, 2016).The another cast of post-harvest losses in 20-30% range has been reported by (Joshi et al, 2007) .The prevention of such post-harvest losses of fruits and vegetables may contribute in regulation of Indian farmers economy twice.

In Conclusion, the development of traditional Indian agriculture requires inculcations of modern and innovative technology in Indian agriculture value chain to attain better knowledge, quality data & communication favoring urban consumers in getting quality production of their own preferences.

In recent years technology in farming has played remarkable & important role in two way system. In one way, it benefitted farmer who is a producer by increasing production of crops and food with low economic input. But simultaneously, it also reduced the process for the consumer by providing better quality of food product in same price to the consumer. The input output relationship

among Indian farmers and their consumers can be improved by introduction of advanced farming technologies to enhance the quality and quantity of food reducing the loss of product, commodity or food.

II. CURRENT CHALLENGES:

The agricultural agribusiness value chains needs the intensive modifications

- 1) Requirement of improvement in production & quality management.
- 2) Lack of coordination in supply chain.
- 3) Lack of Transparency.

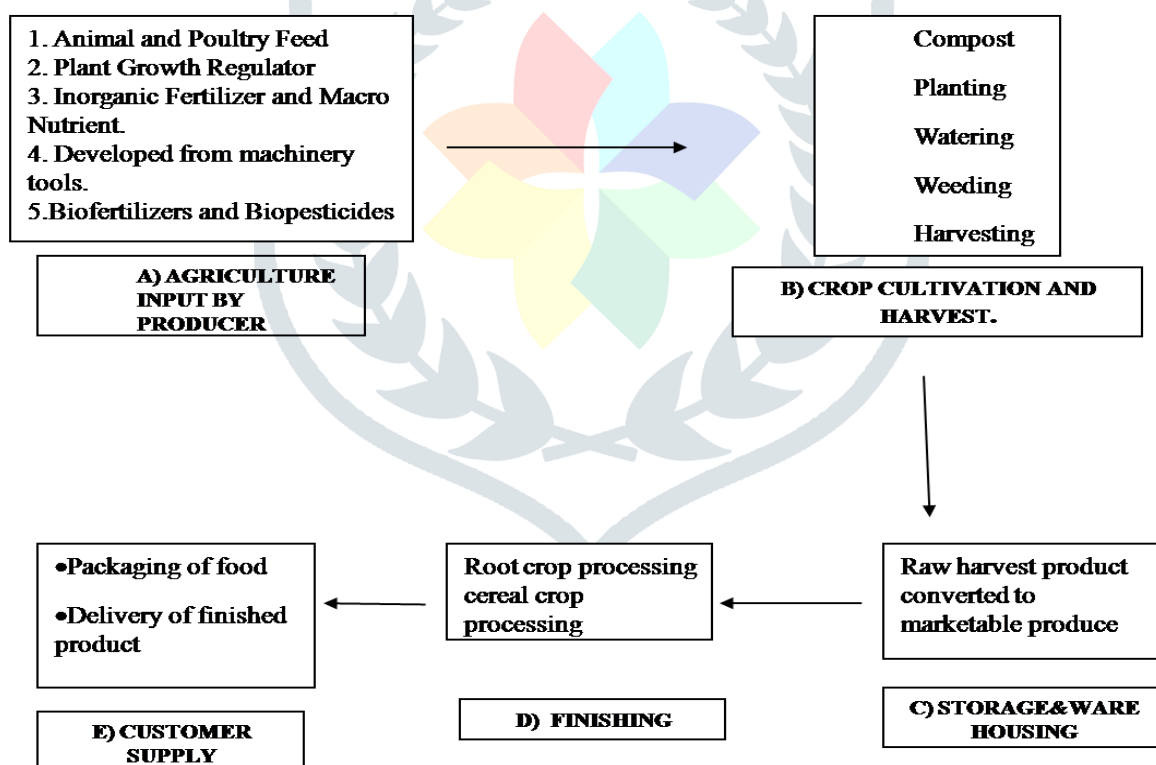
These factors together contribute in efficient designing of agriculture value chain.

1. Requirement of improvement in production & quality management. The previous date reported that 80% enhancement in output has been contribute by "Improved Productivity. At global level excellence at operational level can combat food crisis. The issues of post-harvest management & its processing encounter wastage issues (Kumar et al, 2011).). The food crisis investments are also another problem at global level. These all issues could be managed by the introduction of technology in agricultural value chain.

2. Coordination in Supply Chain. The problem of inequilibrium among excessive food consumption and food crisis in other groups may lead to price rise issue. It requires focus on "orchestration" in supply chain of agriculture. The problem of price rise in developing and poor countries is caused due to unsteadiness in food supply and demand .These food chains are extremely long chains that include many intermediates in agriculture value chain.

3. Transparency in Supply Chains: It has been studied that retrieved data was found to be poor and bad quality which created disputes among "Producers & Consumers" (Sjaak Wolfert et al, 2017). Thus, transparency in supply of food chain considers safety of product & its monitoring along with maintenance of data to eradicate problem of dispute among producer and consumers. Here, Figure 1 explains the requirement of intervention of different technology in each block connected through value chains showing systematic flow of raw material to finished commodity from producer to consumer.

Figure 1: Requirement of technology in well concerted activities: Conversion of raw agriculture input from producer to finished product for consumer with technological intervention.



Therefore, innovative technology is a major game changer that has expertise in coordination of major drivers of agriculture value chains. These include operation excellence, improved production and transparency.

III. INNOVATIVE TECHNOLOGY IN INDIAN AGRICULTURE

- 1. Automation:** The new innovation such as self-driving machines, pulley and tractors has contributed in productivity improvement. These machines could be used at any location and time from distant operating places (Jennifer Kite-Powell, 2016). These machines linked with IoT and collected data automatically determining soil quality type and water requirement condition. These automated machine simultaneously replace labor workforce providing satisfactory and qualitative human replacement.

2. Monitoring technology with data analytics, AI, Drone technology, building tools, cognitive technology: There are two types of technology in application. Currently including remote sensing and ground based sensing. Remote based sensing involves monitoring of high altitude based irrigation, livestock management, soil erosion with variability and monitoring of insects and pest based diseases. Air functional camera captures image and data which is not available at ground level is sequentially imaged for alternation in field. Similarly, for ground monitoring, weather and crop conditions ground sensors could be via IoT using computing devices embedded in objects connected to internet to enable analytics. Data Analytics include IoT, ML and BCT. Previously it has been reported that sensors and satellite monitoring contributes in expansion of data volume for agribusiness sector via high efficiency data gathering instruments. (Op. Cit., 20 and Zach Noble, 2016). It is suggested that frequency of data collection could be enhanced using cloud analytics with IoT, ML & BCT application for enabling farming and processing practices.

IoT as an application supported correlation among structured and constructed data enhancing food application. IoT in combination with ML is used to transform drone collected data to real time system and analyze crop planting, spraying, irrigation condition followed by soil field analysis. AI in combination with IoT and data analytics showed improvement in crop preservation yields (Andrew Meola, 2016). Along with done tech moment crop cycle & right improvement.

3. Innovation in technology for product processing using CRISPR and 3D printing: The innovation technology includes Clustered Regularly Interspersed Short Palindromic Repeats (CRISPR) for the construction of edited and engineered breeds of crops and animals which are more efficient. It also includes meat culturing technology to develop disease free lab generated artificial meat. 3D printing technology is used in food production and additive to create artificial edible and renewable food.

4. Methods to improve resources for utilizing vertical farming Hydroponics and Aeroponics : The process of food or crop cultivation in uniformly stacked vertical layers in unsuitable condition for sustainable production of high quality food is “vertical farming”. In this method indoor forms are designed to develop plant and animal life vertically and supplying nutrients and food to crops in fluctuating climatic condition.

Hydroponics is a process to cultivate plants in water supply with nutrients without soil. Similarly Aeroponics has its advantage over hydroponics where aeroponics supplies nutrient, moisture and oxygen to roots. This technology cut off 95% water use and no pesticides. The aerofarms produce 1 to 7 million pounds of green food every year.

5. Nanotechnology based precision farming: Nanotechnology is a methodology to deliver nutrient to plants with use of “biosensor” for farming. The fertilizer, manure and pesticides could be encapsulated through nanoparticles which could be released slowly and uniformly for plants in sustained manner. The usage of nanotech over conventional farming includes regulated supply of agrochemical doses to protect over usage and land infertility. The plants also be protected from diseases such as biosensor can detect infestation from pests and disease from pathogen. The given table explains the importance of different technologies in agribusiness development. Table 1.

Table 1: Role of Technology in Development Agribusiness

S.No.	Technology	Functions/Role of technology in agribusiness development
1.	Automation	Basic and intelligent custom action for skillful work force. It replaces human labor and workforce. These machines link with IoT and other tools to collect data for determination of soil quality and water.
2a.	Data analytics and monitoring	Monitoring of technology and analysis of provided data through data gathering instruments. Example-. IT, ML, BCT.
2b.	Building tools	The capability enhancement for the development of data.
2c.	Cognitive technology including IT and chat bots technology	Internet of things and use of chat bots for the facilitation and smooth regulation in a farming system. Innovation and informing for sustainable development of agriculture through combination of agriculture and technology.
2d.	Block chain technology Drone technology	Security of agri-value chains, reduction of food waste, food spoilage and frauds by middle men shares. Continuous monitoring of field for uniform distribution of water fertilizers and pesticides supply in fields . It is used for soil field analysis, crop plantation monitoring, spring and irrigation. It also monitors pest infestation and disease.
2e.	Artificial Intelligence(AI)	The chat bots developed with AI are utilized to answer the chat forms of banks and insurance companies.
3.	Innovation in technology for product processing units	New and innovative technologies implementations on processing products related to agribusiness.
3a.	CRISPR	Development and promotion of genetically engineered food.
3b.	3D printing	Development of artificial organs and artificial food to fight diseases and food crisis by forming new edible dishes such as microalgae and seaweeds, seafoods.
4	Vertical farming, aeroponics, hydroponics	Technology for the improvement in utilization of available resources.
5.	Nanotechnology and precision agriculture	Development of agriculture practices using nano particles with seeds.

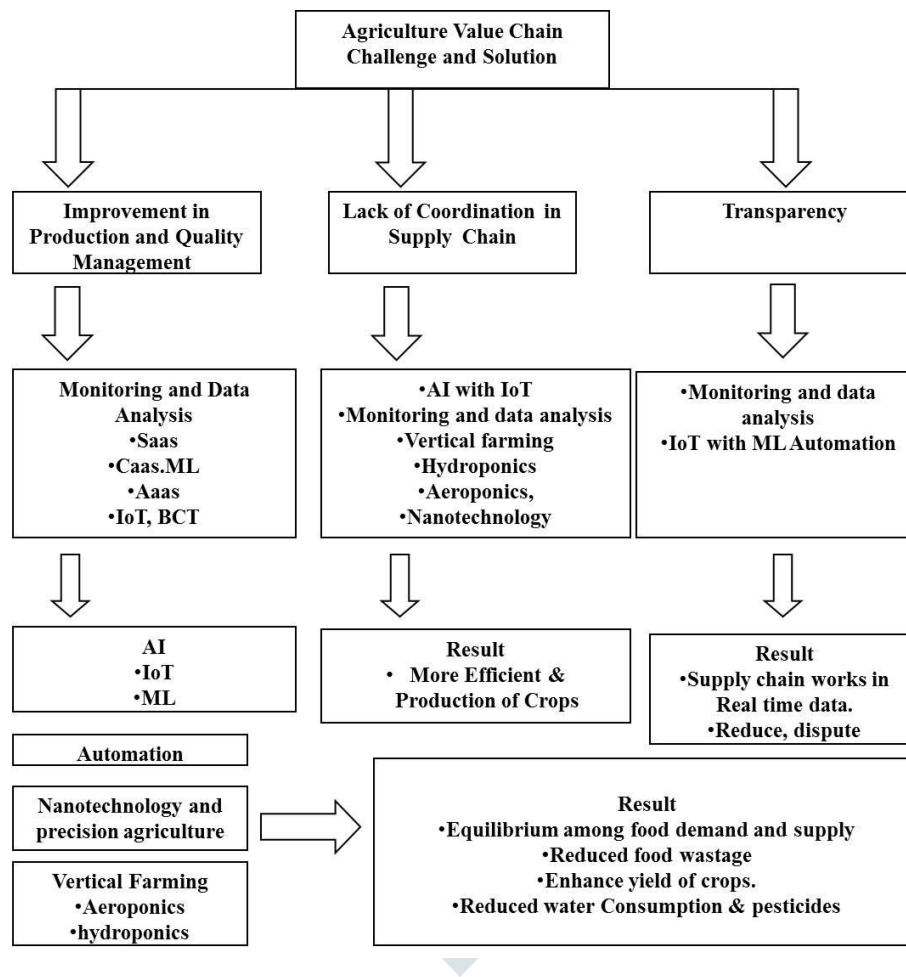
IV. DISCUSSION:

The agriculture value chains functional at national platform have the enough capacity to develop a strong foundation of developing countries at economic and social platform. The economy related constraints in a developing nation are buttressed by various other factors which may include climatic fluctuations, poor political background and scarcity of resources. Therefore, it is mandatory to focus on evolved methods coupled with novel technology for the promising evolvement of economic condition of the farmers, consumers and agriculture market. The threats and challenges to agriculture value chains could be contended with the intermediation of existing technology at various steps of value chains as suggested in Figure 2.

V. CONCLUSION :

In conclusion, the modernization of agricultural through novel technology can disentangle the complexity and imbalance of input and output ratio of Agri-value chains in combating economic demographic explosion with the climatic fluctuation and protection of IPR (Intellectual Property Right) of customer in the era of enhanced competitive threats in developing countries.

Figure 2. Contribution of various technology at different levels of Agriculture value chains



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