

Agricultural Sustainability and Sustainable Agribusiness Model: A Review on Economic and Environmental Perspective

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Abstract

Agricultural sustainability and role of agribusiness model in ensuring sustainability are the new frontiers of research in agriculture and food processing sectors. Sustainable agribusiness models create an integrated approach and an interface between facilitator and actor to realize better economic values with an ethical decision towards environmental stewardship. Agricultural sustainability at present is like a hot pancake and sustainable agribusiness model is a neutral tastemaker among every stakeholder who wants to explore extensively in to the study of sustainability and appropriate business model. The paper delves to review agricultural sustainability and sustainable agribusiness models with economic and environmental perspectives. It identifies the literature gap and suggests the important area for further studies.

Keywords: Agricultural sustainability, Agribusiness model, Economic and environmental perspective.

Introduction

In spite of a very fast growth of manufacturing and service sector, agriculture continues to be very important in Indian economy. Though, the return from agriculture in terms of percentage share of GDP has declined to less than 20 percent, almost half of the total workers are accommodated in this sector.

Since independence there has been a series of reforms and significant improvements realised in agriculture and allied activities. Collective action of farmer association, Public private partnership in different agricultural activities, corporate social responsibilities take several initiatives for conglomeration of agricultural practices with business model in a holistic approach to overcome socio-economic and environmental challenges. Several institutions such as milk cooperatives in Gujarat, sugar cooperatives in Maharashtra, textile and handloom corporations, Contract agreement in seed production, corporate farming, farmer producers company, joint alliance project, global funding projects like technoserve, Syngenta Foundation India, corporate responsibility like Reliance foundation, TRIF, ITC e-Choupal, Government initiative like National Mission for sustainable agriculture, National Horticulture Mission, grass root organisation like PRADHAN, DHAN foundation, Access livelihood, SHGs like Kudumbashree and SEWA favourably contributed in realising an economic benefit to farming community. However, the sector has been encountered with various challenges such as various fast increase in cost of production, a large share of farmer are marginal and small with 86 percent, lack of access to institutional credit, paucity of basic infrastructure and capital, in secured market along with lack of innovation and risk coverage. All this make agriculture not sustainable.

Different measures have been initiated by different stakeholders to make agriculture more lucrative and sustainable. Different models substantiate with program and schemes have also been implemented in this regard. The present paper reviews the agricultural sustainability and different models.

AGRICULTURAL SUSTAINABILITY

Sustainability is a situation which differs from context to context and ideology to ideology. Sustainability as a concept is complex and dynamic, where scholars and the existing body of knowledge expounding different definition and failing to reach consensus to commonness. Sustainability was stated as main principle of the

declaration of the Rio-Earth Summit and Agenda 21 which was established in 1992 at the United Nation Conference for Environment and Development (UNCED).

Agricultural sustainability gained its prominence since the publication of the 'Brundtland Report in 1987', but the ideology of Agricultural Sustainability was noted first in 1798 by Thomas Malthus in his work on '*Principle of Population*' in 1798, where he draw attention on how the ever growing population could surpass the ability to produce the food. The technological development with constraint to economic growth carter to the changing needs of human by exploiting the land through productivity enhancement [1].

With the foot step of green revolution [2], economic reform and policy reforms related to agriculture has brought a change in the global consumption of synthetic pesticides and fertilizer, organic to inorganic consumption where livestock manure is substituted to synthetic chemicals and the decision making ability for input use has also reduced from farmers level to input suppliers. The impact of such creations makes difference with respect to economic, social and ecological dimension. Studies by [3], [4] reflect multidimensional character of sustainability which demands for profit from operation at farmers' level, equitable distribution of wealth at societal level and compatible eco-system and protection towards stewardship in environment.

Seeking attention towards sustainability in agriculture, [5], [6] assess agricultural sustainability on the basis of dimension with level of sustainability. Normative dimension deals with the level of Ecological aspects, economic aspects and social aspects; whereas spatial dimension deal with Local, regional and national level of measuring sustainability level; the third dimension i.e. Temporal rely on long term and short term measures. Sustainability in agriculture has been projected and defines as an ideology where, it visualize it a philosophy which reflects a state of empowerment, awareness of ecological and social realities and being decisiveness.

The multifaceted component of Sustainable Agriculture are interdependent and are categorised upon spatial and temporal perspective with normative approach, which are termed to be basic dimensions of agricultural sustainability[5]–[7]. [8], [9] posit that sustainability in agriculture with its multifaceted role subjected towards food sufficiency[10] which concerned towards maximizes food production within the constraints of profitability, subjected towards community where it focuses on reconstructing economically and socially [11]viable rural systems and sustainability towards stewardship which focuses on limiting environmental damages. Agriculture Sustainability with long term perspective attempts to be at par and equitable which enhance the productivity in the production system, socially and economically viable and ecological soundness [11]–[13].

Reviewing the definition of sustainable agriculture, it reveals commonalities on the concepts. Most of the definition falls under the normative principle of Agri-sustainability i.e 3 pillars – Economic, social and environmental. The Multi-Dimensional approach developed by Food and Agriculture Organisation 1991 has been the most comprehensive and emphasized in various studies.

Food and Agriculture Organisation define sustainable agriculture is the management and conservation of technological and institutional change in such a manner as to ensure the attainment and continued satisfaction of human needs for present and future generation. Such development (in agriculture, forestry and fishing etc) conserves land, water, plant and animal genetics resources, is environmentally non-degrading, technically appropriate, economically viable and socially acceptable.

The better agriculture development in terms of technology and input, the human activities around the production system led to huge losses of soil through soil erosion, loss of organic matter, nutrient imbalances and leaching, World Bank reveals that it has an issue on the sustainability of agriculture which reduces the productivity, less rainfall damage rain fed agriculture and increased risk for farmers. Sustainability with an approach from Conventional practices[14], [15] which led to capital intensive techniques, large scale, mechanized system with monoculture of crops, extensive use of synthetic fertilizers and pesticides at an alarming state make a move towards Sustainable agricultural practices. Sustainable agricultural practices make effort for use of alternative to conventional methods by using on-farm available resource; reduce use of synthetic fertilizer by natural and organic matters, crop rotation, and diversification of crops [16], [17].

The over excessive and inefficient use of synthetic chemicals has impacted not only biosphere but also in economic existences. Necessity to increase the food production in a sustainable manner also demands for input efficiency. But, the input efficiency in the food production is only 15 percent, as 85percent underway in forms to the environment. Particularly in rice, the nitrogen use efficiency decreases from 23 percent in 1970s to 8 percent in 2005 as studied by Indian Nitrogen Assessment, 2017. Report reveals that around 70 percent of all nitrous oxide emission in India, of which 77 per cent is from synthetic fertilizers. Being driven by food grain production, having 62 percent of total cropped area consumed 69.3 percent of total nitrogenous fertilizer reflect in Input Survey, 2011-12.

The policy change during 90's which enforced Essential commodity act in 1977, fertilizer control order 1973 had immensely stressed on expanding production and import. The burden of fertilizer subsidy remains due to stagnant retail price of urea against the continuous rise in the cost of production and import cost. The decontrol of phosphorous (P) and potassium (K) price results in increase in price of P & K, which brings a distortion in the price and use of NPK. Simultaneously the government shift its policy from price oriented to nutrient based subsidy. The nutrient based policy is applied to 22 fertilizer product among which urea is excluded. Urea contains 82 percent of nitrogen excretion. The nutrient based policy led to increase in the price of phosphorous and potassium nutrient and high subsidy rate in urea. Based on present subsidy rate and retail price of fertilizer, farmers contribute only 25 percent on the cost of production and government pay 75 percent as subsidy. In case of DAP and MOP, the share of subsidy to total cost is 34 percent and 37 percent *Input survey, 2011-12*. The prevailing situations of low price of urea which contain 82 percent of the nitrogen create temptation to use more. At present the input use ratio increase to 7.3:2.9:1 in 2016-17 from 4.3:2.3:1 during 2010-11.

The production system is highly prone to uncertainties as it depends upon monsoon, irrigation and certain external factors. The irrigation system depends on monsoon and 52 percent of agricultural land is rained. Flood in the eastern India, frost in north east, heat waves in central and north India [18] increases the occurrence and intensity of hot events. The result of which has been projected in numerous studies [19] of increase in vulnerability; decline in the rainfall in 14 out of 17 basins by 2030, impacting low productivity, reduce crop duration, decrease input use efficiency.

Sustainability as a dynamic concept and its indices vary from context to context, indices which fit one context may not fit to other context with spatial, geographical and demographic differences. Study acknowledging the importance of Sustainability in agriculture where the existing system and empirical findings could not meet the sustainability index. Existing body of literature proposed for capacity building for enterprising marginal and small Producers considering innovation, risk taking, financial, infrastructure, enabling environment and policy support for attaining Sustainability in agriculture.

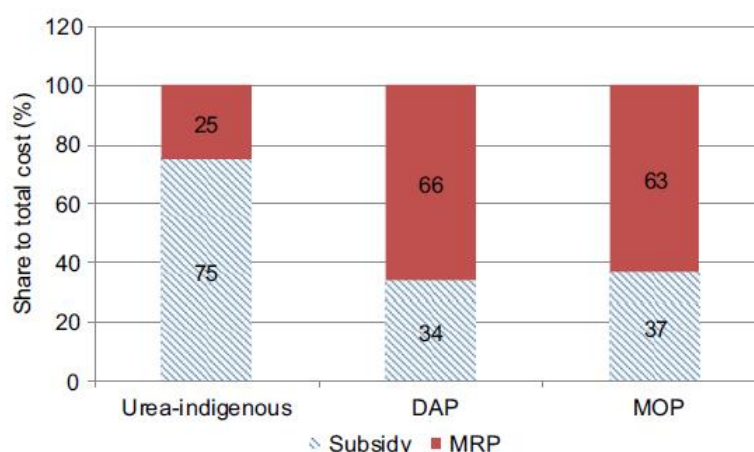
Farm activity as the main stay of rural livelihood has been passing through many up and down where sustainability in agriculture is at stake. According to National Sample Survey Organisation data, 40 percent of farmers wish to leave agriculture because of non-remunerative price realized to them in the market operation [20]and almost 70 percent of agricultural households spend more than they earn and 52 percent more than half of all farmers are in debt. The wide gap difference between what farmers practice and demand in market increases the transaction cost for the farmer and does not attain economies of scale. Small and marginal farmers have dominated the agriculture sectors who are experiencing the strain of slow productivity growth and market competition and other vulnerability situation related to ecology.

Reviewing the existing body of knowledge on Agricultural sustainability, it reflects the condition for sustainability in agriculture is at stake. The Gap that could be established in existing body of literature where economic face of sustainability has been neglected and silent i.e. "Enhancing production and productivity safeguard agro-ecology" has been given more focused with "Minimising cost of Production and environmental indices". But empirically and with practices over the time, it has been observed that despite of various factors, measures and program the cost of production keeps on increasing and the price realisation to the producers does not comes in par with it. The high cost of production and low return, with high environmental cost breaches the standard to meet agricultural sustainability. The study delves to establish and explore" how with increasing cost the producers could get a higher return maintaining environmental costs through certain proposed operational

approach in sustainable manner such as value addition, innovation, risk coverage, diversification and institutional linkage & collaboration.

The gap which has been identified in terms of input use efficiency and controlling measures are, Government under “nutrient based policy” where nitrogenous fertilizer particularly urea has not been taken in to controlling measures for price stabilization and extending huge subsidy on urea. It has tempted and decontrolled the use and manipulated urea use into various industries.

Fig. 1 Percentage of Subsidy on Straight Fertilizer Nutrient



Source: Indian Nitrogen Assessment, 2017

Secondly the budget outlay to National Mission for Sustainable Agriculture (NMSA), PKVY, and mission organic value chain development to promote organic and sustainable farming is 500 crores lesser than the budget outlay towards synthetic fertilizer of 75000 crores.

SUSTAINABLE AGRIBUSINESS MODELS

Sustainable agribusiness model to small farm is vital for self-sustainable growth. Changing market scenario, competitiveness, global trade culture, consumer driven market demand are somehow unrest the producer to produce quality, bulk, round the season and to develop a strong supply chain. Various initiatives have been taken by corporate entities, global funding agencies and grass root organisation to uproot sustainably business model among marginal and small farms. [21]expresses that traditionally used of conventional business model and delivery mechanism emphasize on increasing efficiency and economies of scale, but however in many context it was observed that business model have not contributed much along with declining profit. Over the years the sustainable way of dealing with the stake holder has been important and dynamic. Scholars recommended that contribution to innovation in sustainable agribusiness model has become more important due to global challenge that are linked to economic, social and environmental sustainability in food production[22][23]. Sustainable model is an analytical tool to measure the performance how sustainable the farm performs in impacting the livelihood. There are various models which have been operating with distinguishing the attributes along with theoretical contribution of the models. Sustainable approaches, innovative idea are a key to become more profitable as well to become sustainable when the farms face internal and external stress[24], [25].

Scanning the dynamicity of present business environment, new approaches in ideas and operational functioning has been functioning to benefit collective strength of small and marginal farmers. Business model linked three integrative challenges in the agriculture and food sector that needs to overcome i.e. the interdependency between food production and environmental stewardship; societal and health factor; the size of farm with the supply chain. Model of producers driven, model of buyer driven and model of Intermediary driven have been

functioning to overcome the unsustainability in agriculture and food sector that integrate policy, people and market.

Model for Sustainable business integrate across backward and forward linkage to benefit its stake holder across the supply chain system. The producer driven model like cooperatives, farmers association has a mixed experience of providing its members economic benefit to access market competitions. Study found that traditional cooperatives are limited towards agribusiness activity, members oriented and become averse in decision making and lack in entrepreneurial culture [26], [27] Collective association continues to be important strategy for farmers to remain sustained and face market competitions and commercialization. But over the time, this producer driven business model could not overcome market stress and expectation. Business cases of Indian origin too even got strain due to changing market scenario but few businesses with entrepreneurial orientation presently contribute holistically.

Buyers driven Model comes in to existence due to market stress and low qualitative contribution by the farmers. This model seeks efficiency in the supply chain to benefit model retail chain, Terminal market, processing industry. Buyers model are produce oriented and focuses only on what they specialize with. Pre harvest contracts, Contract Farming, Corporate farming, Pepsi Co, SAFAL fruits and Vegetable marketing are some of the industry operation on buyer model. Study reveals that buyers driven model does not benefit small and marginal in the supply chain system of business operations [30], [31], [34].

Creating an interface between market and small & marginal producers to overcome imperfections enhance capacity of small holdings and enables for price risk is an important aspects of intermediary model. Model comes with market thrust for Socio-economic development of poor, market for their produce, regional development and promotes entrepreneurship. Various cases like public procurement system, Farmer Producers Company facilitated by NABARD and grass-root organisation, reliance foundation on livelihood, Techno-serve India, Syngenta Foundation India working with farmers to link them with backward and forward integration of value chain in agriculture, so as to benefit their socio-economic condition and taking care of environmental [33], [34]. But the intermediary model too has demerits which do not hold farmers to act independently after they withdraw and. Along with promoting collective strength and bargaining power of farmers, it seems to be difficult to cultivate sustainable entrepreneurial culture among marginal and small farmers at many cases where many business lack in adding value to their supply chain, making grass root innovation and fair extension system. Farmer takes price risk at the production and market level but contributing for risk coverage have been observed minimally. Farmers depend upon institutional risk coverage for uncertain conditions. But some independent working group like Rythu bazaar in Andhra Pradesh, HaryaliKisan bazaar conglomerate with DSCL, ApniMandi are some successful cases which could benefit farmers at a long run[32], [33].

Table 1. Business Model in Agriculture and Food Industry

Business Models	Stakeholders	Objective	Literature Reviewed	Institutions Involved	Gap
Producers Driven	Cooperatives, Producers Organisation, Farmers Club	Collective action, new market, to realize better market price	[26]–[28]	Cooperatives like AMUL, Maharashtra Sugar Cooperative, Textile and Handlooms cooperative, Marketing Society like IFFCO, KRIBCO, NAFED, MARKFED....etc	Limited operational experience, operational success cases does not reciprocate elsewhere, Producers driven model holds welfare oriented approach which remain difficult for producers to cooperate with new generation

					institutions who hold entrepreneurship approach in their operations.
Buyers Driven	Processing Industry, Exporter, Modern Retails units	Assuring supply within and across the country,	[29]–[31]	Contract Farming, Corporate farming Reliance fresh, Pepsi Co, SAFAL fruits and Vegetable Private Ltd....etc	Produce Oriented, focus on large farmers and quality of produce, verbal and pre harvest contract often breach the contract agreement.
Intermediary Driven	Departmental stores , Government projects for promotion, Global Funding agency, NGO and Grass-root organisation	Socio-economic development of poor, market for their produce, regional development, Promote entrepreneurship	[32]–[34]	Public Procurement system, Farmer Producers Company, Techno-serve, Syngenta Foundation India, CSR on Livelihood Program, National , National Mission for Sustainable Agriculture, Contract Farming,	Top bottom approach of planning and framing strategy, Lack of adaptiveness, neglected extension and coordination.

Source: Develop by Author

Every sort of business model can well reciprocate if the model is well unstated by the stakeholders and secondly it's operational design and deliverables were develop keeping in mind the last users of model. Present form of business model in food and agriculture sector needs entrepreneurial approach in its operation to stabilize and sustain them self.

SUMMARY AND CONCLUSION

Realising the complete potential of agribusiness units in both agriculture and food processing sector is felt to be vital along with protection of natural stewardship. Sustainability in agriculture is an issue which needs to be addressed with an integrated approach, where sustainable agribusiness is one of the important means. Trough the critical review of the relevant literature, the following important gap of the existing body of knowledge on agricultural sustainability and agribusiness model are given as under.

- The economic face of sustainability has been neglected and silent i.e. “Enhancing production and productivity safeguard agro-ecology” has been given more focused with “Minimising cost of Production and environmental factors”. The high cost of production and low return, with high environmental cost breaches the standard to meet agricultural sustainability. Further study can explore” how with increasing cost the farmers could get a higher return maintaining environmental

costs through certain proposed operational approach in sustainable manner such as value addition, innovation, diversification. It can lead to cost effectiveness.

- It has been identified in terms of input use efficiency and controlling measures are, Government under “nutrient based policy” where nitrogenous fertilizer particularly urea has not been taken in to controlling measures for price stabilization and extending huge subsidy on urea. It has tempted and decontrolled the use and manipulated urea use into various industries.
- The agribusiness model however tries overcome various imperfections in its operation but the existing body of knowledge remain silent on in spite of various business model intervention, why the primary stakeholder i.e. farmer could not retain a better share of net return in the entire supply chain.
- The mismatch of strategy and planning by the facilitator and poor coping attitude among the beneficiaries remain remains silent in the existing body and can be address further.

Improving the livelihood of the marginal and small farmer along with natural stewardship is imperative for the sustainable growth. Maintaining sustainability standard in the business operation to achieve bigger roles by addressing farmers’ issue of raising productivity with economic benefit can be overcome by strategic decision of farmer and farmers’ association. Sustainability in agriculture and sustainable agribusiness model are ideological and context based issue which can be address by diagnosing potential within the context to address the issue. Entrepreneurial action which accommodates innovation, value addition and risk coverage with ethical decision towards environment can sustainably contribute towards safeguarding agriculture and ensure effectiveness of agribusiness unit.

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