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The analysis of the sustainable food value chain via business model canvass techniques creates a scope of business opportunity.

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ABSTRACT

Convergent innovation model has based on linear approach to define next generation requirement which relies on science technology, innovation program, and full fill the requirement of three themes as health of people, environment and economy for future, which build firms strategic vision, through develop new product, new process and practices in a novel way. The current research describe the importance of convergent innovation technology, sustainable pulse value chain and developed convergent innovation frame work model and also establish potential mapping between convergent innovation with sustainable pulse value chain and discussed the pioneering initiative of convergent pulse innovative programmer in Indian pulse processing firms. The current research study based on explorative method and descriptive method, and review literature based on primary data and secondary data. The convergent innovation technology related, from the field of science, technology which highlight evolution of convergent innovation technology get benefitted to all sectors, as well as the collaboration of convergent innovation with sustainable pulse value chain increases the efficiency of pulse processing firms and enhanced sustainable pulse value chain. The convergernt innovation upgrade innovative technology and made expansion of business. It operates in multilevel and cross-sectoral collaborative platforms through pulse processing industries and introduced as in the, form of pulse innovative program such as Odessa pulse program, tata pulse initiative programme etc. which establish the link between villages and modern value chains. The reseach focused on mapping of convergent innovation with sustainable pulse value chain to generate benefits.

Keyword: Convergent, Innovation, Sustainability etc.

1. INTRODUCTION

The convergent innovation introduced as form of meta innovation which integrate human and economic development outcomes which generate behavioral and eco system transformation at scale to develop sustainable prosperity and affordable universal health care (Dube, 2014)¹. Sustainable Pulse value chains are highly diverse, which range from long-distance commodity export to local markets, their features consist of traditional landraces. The sustainable pulse value chain actors are important, efficient which generate equality in pulse value chains and highly depends upon better understanding of major actors, as smallholder farmers which participated in pulse value chains. (Mungai, 2016)². The convergent innovation of pulses generate diversified varieties of pulses which enhanced the sustainable pulse value chain, and increases pulse productivity, farmer incomes and establish single and multiple linkage between farmers with market out reach (Bodenheimer, 2005)³ (Deaton, 2013)⁴. The convergent innovation techniques in sustainable pulses value chain forecast the future trend related pulse commodity. The objective of convergent innovation in sustainable pulse value chain to provide for rich integration of small holders farmers with national and global agricultural and food system health system, to establish value chain and global pulse markets. The current research identify the analytical innovation where convergent

innovation disciplines intersect with cross sectional research , single , linear and multiple approach(Dube, 2012)⁵ . and combined with technological and social innovation which focus on the most on convergent innovation takes a modular approach(Dube, 2014)¹. The current research has classified into three different section as a. The first section of research study describe the advantages of convergent innovation techniques and sustainable pulse value chain, b. The Second section discussed how the convergent innovation techniques inculcate with sustainable pulse value chain and define the convergent innovation frame work model .. c. The third section describe the pioneering initiative of convergent pulse innovation programme in Indian pulse processing industries. (Dube, et al 2014)¹ identified the importance of convergent project in India and also determine the role of convergent innovation technology in health sector.

First section 1.1- Convergent Innovation techniques

Convergent innovation develop interdispilarny approach in the field of health , agriculture , sustainability ,science and technology to strengthens the capacity of convergent innovation technology and sustainable pulse value chain for delivering of quality pulse processed food. Convergent innovation techniques develop road map structure as a set of innovative , target and achieve goal oriented initiatives , which allow for creating of partnership to attain a new collaboration model which unite business , govt civil socity and academic to build a healthier world(Dube,L.et al. 2014)¹. the Convergent innovation develop collaboration with Sustainable pulse value chain (Laurette Dubé, 2014).¹ which promote the transformation process that convert the agricultural commodities into value-added processed food. The food processing sector has divided into major key domain, where business strategy and investment had played prime role for increasing the performances of processing, and economic gain and develop sustainable nutritious ¹⁰, (Jha et al. 2014)⁶. Convergent Innovation analyze the future requirement which based on science and technology of understanding individual, organization, system behavior for creating next-generation transformative models of innovation. The Convergent innovation approach has generate four key prospects, (1) to study the novel scientific insights and develop methods to inform strategies for incentive design and behavioral changes,(2)developed strategic business engagement (3) community mobilization and cross-sector collaboration (4) ever increasing digitization of operational, administrative data and digital literacy within and across organizations, value chains, and systems in industrialized societies(Dubé,2014)¹.The convergent innovation model empowered to integrate an advanced digital infrastructure , sharing scientific knowledge and drive human behavior, in varying context and gathering datas(Dube,2018)⁷.

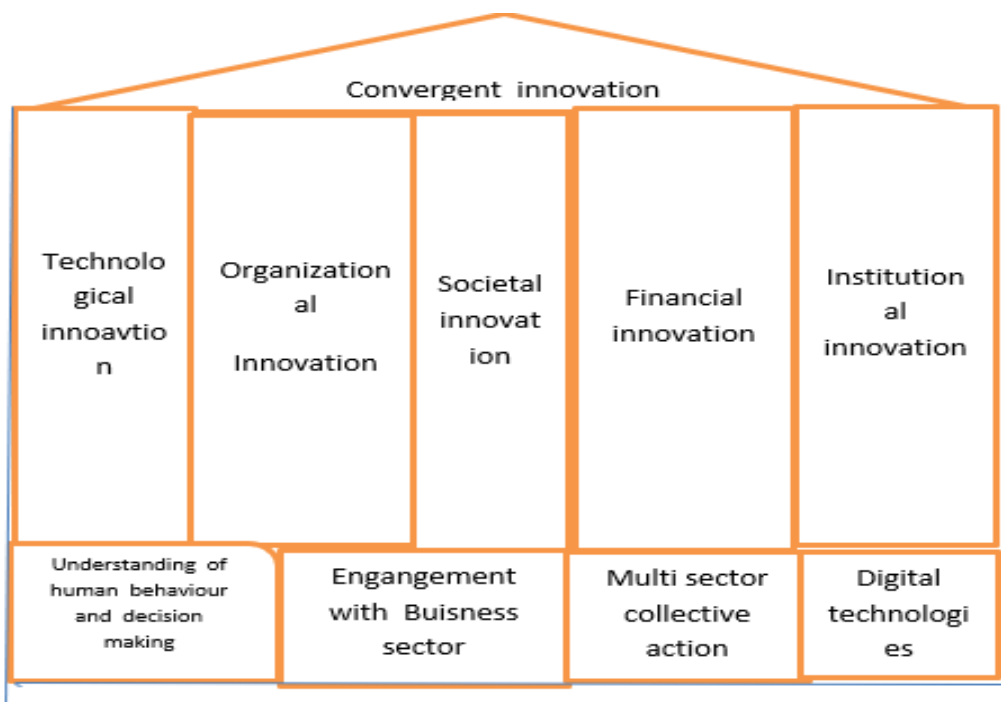


Figure 1|
Convergent innovation.

Figure 1. The Given figure illustrate the dimension of convergent innovation technology .

Source: Convergent innovation for sustainable economic growth and affordable universal health care: Innovating the way we innovate (2014)

First Section 1.2- Importance of Convergent Innovation technology

The convergent innovation achieved benefit to generate high margin, low cost, and value added quality food (Dube,2018)⁷. It generate benefits to collaborate the smarter institutional arrangement and developed the more effective rules , policy regulation which develop a frame work structure to guide decision maker across different sector of society and develop collectively effort to adopt and eliminate malnutrition , food scarcity and hunger . The Convergent innovation technology provide benefit to study the deep insight human behavior and full fill the demand of food and develop partnership for sustaining and scaling health nutrition as per the actual requirement, and play a vital role making health

The Convergent innovation developed nutritional security and become corener stone of strategy to develop the population move from subsided to industrialized modern market. this shift correspond for innovation strategies and made pipelines to optimize economic and human development, is called as convergent innovation (Meda, 2018)⁸. The convergent innovation approach developed information technology through big data and artificial intelligence, which will used in several field and forecast the future trends and focused on user generated information through social media analysis performed by convergent innovation techniques also prepare report related to food health, it generate intersectoral process for creating transactional framework to address most of complex challenges, which define the future scopes and opportunities of 21st century(Dube, 2018)⁷

First Section 1.3- Sustainable Pulse Value Chain

Sustainable pulse value chain approach is consist of best agronomic practices, the different component of pulse value chain excel in different climate condition and geographical location. it is examined by developing nation to understand their impact on agriculture, pulse production and pulse processing firms which become as major sources of upgradation of technology, expansion of business, and introduction of pulse product globally (P.K. Joshi et al, 2017)⁹.The application of sustainable pulse value chain is increses the efficiency of pulse processing develop coordination between each sub process, assign responsibility to each driver. Which generate sustain pulse production and promote foreign direct investment, increasing processing capacity and export of value added pulse product. The sustainable pulse value chain develop pulse market to direct access of market information, innovate new tools for provision of relevant market intelligence, build to promote the sustainable pulse value chain. The Sustainable pulse value chain process consist of crop producer, grower seller consolidator, middle agent which performed primary processing as cleaning, color, sorting, grading, splitting, polishing, packaging generate semi processed food, which food pass through value chain for secondary processing to perform agglomerate blend of pulse value addition activities e.g. floor fraction, starch, fiber and protein which blended with verities of mix containing various pulse ingredient for making complete processed food and feeds for cattle. The intermediate pulse food product are generated by food manufacturer and performed marketing through distribution channel reach whole seller/ retail for sales.

Table 1. The major challenges in the sustainable pulse value chain

Challenges	Opportunities	Description
Low on farm productivity	The sustainable pulse value chain boost production and consumption of pulses is benefical for both nutrition and made sustainability factors (dutta,2021)	Small holder productivity contrained by limited use of improved input, small fragmented plots, marginal soil, limited use of improved varities, and inadequate farm management practices
Inefficient marketing system	Pulse value chain increses the production to provide the regular procurement of pulses at MSP and focused on production of pulses (dutta, 2021)	Limited effectiveness of marketing due to involvement of many actors, leading to excessive handling and weak demand signlas and inadequate finacing and transport.
In consistent export supply	The Pulse value chain are gaining importance to achieve food security and improving nutrition as well as transforming the agriculture and contribute to sustainable development goals (knaeph,2017)	Limited relationship between exporters and importing countries, unstable and erratic demand from importing countries leading to limited number of contracts between exporters and producers

Source ; Pulses Value Chain Potential in Ethiopia Constraints and opportunities for enhancing exports, International Food Policy Research Institute Sustainable solution For ending Hunger and poverty, July 2010.

SECOND SECTION 2.1 : LITERATURE REVIEW

The Literature review analyzing the convergent innovation technology and their implication in sustainable pulse value chain, also dicussed their interdisplinary role in various fields to provide the benefit of emerging innovative technology in business and human life and discussed the sustainable pulse value chain process and their key role in pulse processing firms. (Dube, 2018)⁷ Convergent innovation is form of meta innovation, which integrate human, social, technological and behavioral innovation. Which incresese its feasibility to build different blocks enable condition related to deployment and scaling up operations. (Dube, 2018)⁷, also defined as convergent innovation is an artificial intelligence developed through Big data which transformed the data into consumer behavior insight and find an important implication for inclusive growth and emphasize for affordable, accessible behaviour. (John McDermott, 2017)¹⁰. The convergent innovation technogy performed The food system transformation process performed through convergence techniques has determine the role of pulses in healthy diet and made effective policies and regulation (Dube et al. 2018)⁷. The convergent innovation techniques integrate human and economic development out comes, to generate behavioral and eco system transformation, achieve at scales of sustainable prosperity and affordable universal health care (Awckiasamy et al. 2014)¹¹. The convergences techniques are consist of various stages of innovation process, has based on convenient sampling, descriptive analysis to define the stages of process and invention help to calculate the merge, and percentage of convergence, (dube, 2014)¹. The food system innovation techniques of C.I. had developed frame work structure to achieve objectives which based on concrete building project to singly and collectively work (Austosh k. tripathi, 2018)¹². dicussed The low growth of pulse production in terms of

low profitability and made working price more effective, for creating policy and action plan for helping farmers gain sufficient income, to promote investment technology, and productivity (Laurette Dube ,2012)¹³ The role of Convergent innovation in agriculture developed objective to integrate Farmer with national , global , agriculture , to establish the food system, health system, value chain and market innovation. pulse value chain affect starch and protein digestion and made minerals bio accessibility of pulses by influencing the nutrient composition.(Dube et al. 2004)¹⁴ Pulse are group of commodities which are an affordable and environment friendly, and is consider as source of protein such as micronutrient , complex carbohydrates and several vitamin(Reddy, A.A. 2009)¹⁵. the pulses are primary source of protein are known to be multiple health benefit , which are most affordable and significant in low-income countries.In(Leterme, P. 2002.)¹⁶the pulses are known to be health benefits , consumption of pulses has been found to keep blood pressure under control. (Srivardhini jha 2014)⁷ convergent innovation to underscore the importance related to health, safety , nutrition and agriculture to achieve sustainable development goals and establish bridge with sustainable pulse value chain in a sustainable manner. yirgra (2010) the pulse value chain actors are well integrated and made function as a unified system to minimize the welfare of all actors involved from production to consumption.(hedge ,2012)¹⁷The pulse value chain develop the frame work structure of pulse production, cost structure and margin of different stages of values chain and made implication of cost and margin on farms income (Kumar, 2018)¹⁸the sustainable pulse value chain frame work model used for solve two purpose ,One for policy making Other for rural development planner to formulated related policy and concentrate on product specific market.

Research gap: the research discussed the concept of convergent innovation technology and their importance and which define there multiple role in various fields , the convergent innovation technology based on meta innovation and followed market driven approach , the implementation practices of convergent innovation in industries is low due to higher cost , time consuming and lack of knowledge regarding convergent innovation technology . The sustainable pulse value chain consist of sequence of activities performed in value chain process. The inculcation of convergent innovation technology with sustainable pulse value chain is difficult to accept in pulse processing firm due to low production of pulse and unavailability of pulse value chain , lack of technology innovation etc.

3. RESEARCH METHODOLOGY

The research study conduct on explorative method and descriptive method and collected sampling from primary and secondary data from the field of science related journals.

Research objectives:

- I. The research study analyze the convergent innovation technology and their advantages.
- II. The research study the sustainable pulse value chain and conduct literature review to identify the importance of convergent innovation technology in sustainable pulse value chain.
- III. The research study analyze the convergent innovation techniques inculcate with sustainable pulse value chain and define the convergent innovation frame work model
- IV. The research analyze the participation of convergent innovation technology in Indian pulse processing firms and in health sectors.

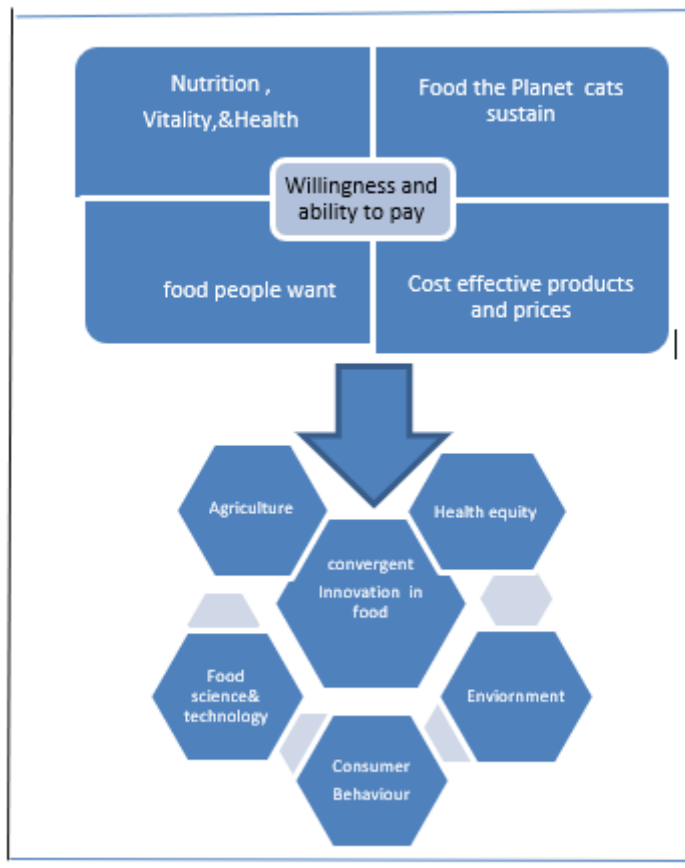
II Section: Collaboration of Convergent innovation technology with sustainable pulse value chain. The advanced form of Convergent innovation collaborate sustainable pulse value chain model to develop is intersectoral form which combines with technical , social and industrial innovation to establish link between pulse production , process and developed government policy. The major aspect of advanced convergent innovation model with sustainable pulse value chain to protect resources and build firms strategic vision, through develop new product, new process and practices in a novel way and had performed in sustainable pulse value chain , also increases pulse productivity , farmer incomes and establish single and multiple linkage between farmers with market out reach(Bodenheimer,2005)¹⁹(Deaton, 2013)¹⁰. The collaboration of convergent innovation with sustainable pulse value chain frame work model had based on three main themes , as . related to agriculture and food market growth, b. Experience related to the integration of small holder agriculture into national and made global business agendas, c. Insight into convergence building institutional design and made policy including a review of complexity science method which can inform convergent develop road map for a broader , solution-oriented and trans disciplinary approach to society , made convergent innovation is the core engine of economic growth in industrial sector (DUBE ,2012)¹³. The collaboration of Convergent innovation with sustainable pulse value chain generate frame work model which maps to engaged collective organization effort to perform societal and commercial address, the actual requirement of society and transform. A successful sustainable pulse industry , followed the pulse value chain actors and perform function as a unified system in a way to maximizes the welfare of all actors involved from production up to consumption. The sustainable pulse value chain develop analytical framework, and divided into three broad stages, namely production, aggregation and marketing, and commercialization towards exports. The characterizations of each stage were based on interviews with stakeholders across the value chain and participatory assessments performed (Yirga, 2010)¹⁴. The collaboration of convergent innovation technology with sustainable Pulses Value Chain is to set roadmap structure on the course of strategic development by addressing constraints in a comprehensive manner and defining concrete opportunities which can be realized through the specific steps detailed in its Plan of Action (PoA),(Julius , 2020)¹

Supply chain Phases	1.Producers	2.Processors	3. Distributors	4. consumers
Roles	1.Research and development 2.Sustainable Farming/Production 3.Fair Trading	1.PrecisionHarvest Ecofriendly processing and manufacturing 2.Value processing in triple Bottom line approach	1.Distribution 2.Retailing	1.Shopping 2.Responsible consumerable shopping
Drivers	Management and management skill. 2.Cultural change for Technological and orgainastiona innovation	Management 1.Small and Flexible business function 2.Leader ship and vertical supply chain interation	Management 1.Supply chain intehtrean 1. traceability	Management 1.Food prices which takes account pPositive and neative extralinites
Drivers	Strategy 1.Buisness complint high standard ethical and CSR Standard Financial 1.R&D investment 2.Enhancing profitability androwth performance in long term	Stategy 1 Achieving in scale Process activites compliment with CSR standard Fiannacial R& D investment	Stratey 1.Buisness startey focused on high quality out put. 2.Compliance with Sustainability Standards Financial 1.Equal remuneration of suppliers	Stratey 1.Food security (e.g. availability) 2.Food safety (e.g. traceability) 3.Health and wellness

Source: Fig. 1 – A schematic representation of food value chain , Readapted by the authors from Deloitte (2011 ,

Figure2 ; The Given figure illustrate the sustainable pulse value chain process , and define each sub function of producer, processor , distributor and consumers.

Sourc: Jian-Yun Nie(2018) , Platform for convergent innovation in food



Source: Jian-Yun Nie(2018) , Platform for convergent innovation in food

4. The pioneering initiative of convergent pulse innovation programmed in Indian pulse processing Industries
 Convergent innovation across pulse value chain lead to convergent out come in different segment of pulse value chain ,which develop modular approach, to break down the complex challenges of pulse value chain into tractable project .This modular approach of pulse value chain acts as unifying plat form to provide a blueprint, which establish link with various project. The CI (Convergent innovation) is consist of different project which transform the pulse value chain encompassing producer to consumer actor . it includes large , medium and small business , (Srivardhani K.Jha , 2014)¹⁵. The pioneering intiatives of convergent innovation in sustainable pulse value chain in pulse processing firm to achieve sustainable development goals and

increases strengthen capacity of pulse processing firms. For maintaining the sustainable food quality of a processed food, develop a successful partnership which is required between the government, private industry and farmers to implement sustainable food practices. (Dubé, Pingaliet al. 2011)¹⁶. The Convergent Innovation model aims to accomplish nutrition and health as drivers of commercially successful food innovation in the field of agriculture, health sector etc. The different segment of pulse value chain develop modular approach as in the form of project are

a. PIP (Pulse innovative program) is a consortium pulse based project involve in food innovation to scale up and seed their behavioral changes to increase demand of pulse product.

B. Tata pulse project initiatives belong to private enterprise to improve pulse production, processing and consumption for equitable distribution of value chain activities.

c. The Odishia pulse convergent innovation project is a collaboration involved with non government organization institute to simultaneously drive positive income nutrient and health outcome for small holder farmers (Laurette Dube, et al 2014)¹⁷.

VI. Convergent innovation pulse techniques in Health sector

The convergent innovation is process to integrates human and economic development and their outcomes which is used as transformed for sustainable prosperity and affordable health care within societal paradigm. The interdisciplinary role of Convergent innovation pulse techniques which lead to sustainable health nutrition, which generate health issues, in several countries is required focus towards health care cost out spaces, while many medical and health technologies are relatively higher cost in developing countries and developed countries spent around 10% to 12% of their national GDP on health care limited (Bissonnette, L. et al. 2012). For achieving the sustainable health the different model of health care innovation is developed. In India the health care is relatively higher cost and more complex problem, less than 5% of GDP are spent on health care (WHO, 2012), currently only 30% of the Indian population are getting benefit from health care finance, which cover with out of pocket cost related to health expenditure and amount of 40% of household's non substantial expenditure. Convergent innovation is developed the pulse based road map structure for sustainable prosperity and affordable universal health care which depend upon the capacity of technology and innovation in the way to accelerate convergent technology(). The convergent innovation is a solution oriented approach, which combines with technological and social innovation as form of meta innovation to integrate human behavior and economic development outcomes through behavior and ecosystem transformation. The health care innovation is prime requirement of develop and developing nation to provide nutritious diet, which reduce the complex diseases such as cardiovascular disease, epidemic diseases, food born diseases and malnutrition etc. The developed country has health care innovation model to cover major conical disease, and provide facilities medical treatment, they spent approx 30% of income as GDP (Gross domestic product) of income, In today's scenario, the health nutrition is first priority for all developing and under developing countries is demand of current and future group of population related to woman, under nutrition and malnutrition affected people, pulse played an important role as protein substitutes, which reduce the protein deficiency in body and generate sustainable health nutrition. The convergent innovation consist of smarter institutional arrangement and developed as more effective rules, policy regulation which develop a framework structure to guide decision maker across different sector of society and collectively develop the effort to adopt to eliminate malnutrition, food scarcity and hunger.

5. CONCLUSION

The pilot scale project based on convergent Innovation in sustainable pulse value chain support small holder agriculture farmers and business owners to establish links with health, nutrition and community development effort to support small holder agriculture as an input source of food industry supply chain.

The research generate the India Pulse Innovation Partnership programmed, which provides a platform for developing pulse innovation based food products, and engaged with food companies of all sizes, including small firms in rural and urban places. The convergent innovation develop overview of structure sustainable pulse value chain which transformed into market oriented priorities and create global platform of pulse sector and provide market side information. The research project support the foreign direct investment, develop processing capacity, facilitate technology support, transform to upgrade value addition techniques.

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