

## Volumes and Flows Issue with Vegetable Industry in India

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**Abstract:** To fulfill the increasing national and international demand for vegetables, India needs to pick up the pace in vegetable production that can take it on a long way of success in vegetable sector growth. Now horticulture has proved its position as one of the potential agricultural enterprise in accelerating the growth of economy. The study is quantitative in nature, though the base formulated is completely a summary of qualitative study. A self-prepared instrument used for collect data where five vegetables got consideration for the better understanding of the business. The study is conducted in Odisha state of India and main respondents are the vegetable distribution channel intermediaries. All together a sample of 756 participants of vegetable supply chain included in study. The cluster sampling method of probability sampling is used, since supply chain participants are living in clusters as markets or villages. The research methodology is directly concerned with solving the problem lying with the agricultural supply chain specifically study on intermediaries.

**Keywords:** Agriculture, vegetable, supply chain, vegetable issues, intermediaries, participants

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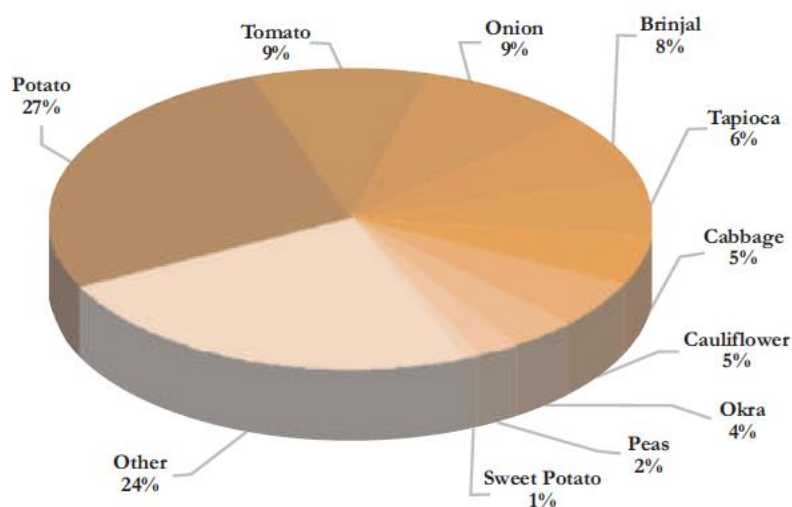
### INTRODUCTION

Agriculture is the dominant sector of Indian economy and contributes to the sustainable growth. During the 11<sup>th</sup> Five Year Plan (2007-12), it has done comparatively well in terms of output growth and the gross domestic product GDP, got a high marked contribution of agriculture in the achieving the growth of 3.6 per cent. The 12<sup>th</sup> Five Year Plan has estimated the growth target to be 4 per cent for agriculture. Indian agriculture is getting positive support from rising external demand and the participation in the liberalized, privatized and globalized (LPG) economy. The foreign direct investment (FDI) by the Government of India has allowed 100 per cent in storage and warehousing including cold storages to boost investments for agriculture. The responsibility for agricultural development is with the ministry of agriculture as the nodal agency and the department of agriculture is responsible for execution of all the development activities of the agriculture sector in India. Now horticulture has proved its position as one of the potential agricultural enterprise in accelerating the growth of economy. It is playing very important role in the securing nutritional needs, reducing poverty and employment generation programs for the country. It is offering a wide range of options to the farmers for produce cultivation and providing ample scope for sustaining large number of agro industries which generate huge employment opportunities. To fulfill the increasing national and international demand for vegetables, India needs to pick up the pace in vegetable production that can take it on a long way of success in vegetable sector growth. India is committed to reach a

higher yield with the target by 2020 with 225 million tons and by 2030 ending, 350 million tons of vegetable production, making an incredible journey of agricultural development. The India's climatic condition has huge existence of adequate eco-diversity that enables to grow more than 60 vegetable crops. More than this the efforts are taken with almost 30 lesser-known and underutilized vegetable crops are getting promoted for research in these suitable climatic conditions. The major research is done on the vegetable crops, which are mostly under the specific care; comprises of 30 crops are tomato, cauliflower, chili, eggplant, bitter gourd, okra, bottle gourd, peas and melon etc.

In vegetable production India plays leading role among the competitive countries of the world. The possibility to grow the more than hundred different types of vegetables is due to the blessing of nature to the country with diverse climate and distinct seasons. As per the statistics of govt. of India 2009-2010, potato is being the staple food and widely used in the kitchen of every household without the difference of rich or poor ranks first (26.6%), whereas tomato (8.6%), brinjal (8.0%), onion (10.5%), Cauliflower (5.1%) and cabbage (5.3%) vividly follow their share trend in the kitchen in the main food course. There is mismatch in area available and productivity of vegetables throughout the country from northern states like UP, West Bengal, Bihar and Odisha to southern states like Tamil Nadu and Karnataka, who are the leading vegetable producing states in India. During the preceding decades vegetable cultivation has shown considerable development.

Production Share of Major Vegetable Crops in India (2009-10)



Production Share of Major Crops in India (2009-2010)

India is contributing to fulfill the world demand by exporting huge quantity of fruits and vegetables to the whole world and is being the fruit and vegetable basket of the world.

The seed production, storage and processing sector has developed a new platform and increasing business opportunities. The increasing demand for quality seed production have been already taken as opportunity by many private enterprises and are increasing their capacity for quality seed production. Since, India is a developing country, the conventional refrigerated storage systems are getting used, but there is a strong need to develop and adopt the modern system that can economize energy consumption as well as to ensure better quality of stored produce. The increasing demand for refrigerated vegetables with a long shelf life has led to opportunities for entrepreneurs in the area of post-harvest processing and storage of vegetables and having high potential for development. India is being more attractive to many multinational companies for the establishment of links with the Indian counterparts to get the support for vegetables. The vegetable sector itself has ample opportunity for business and it is increasing year-on-year basis including the allied supports like consultancy, contract farming, mechanization, crop insurance, retailing, packaging, high-tech farming and procurement would be favored in vegetable industry. About seventy five (75%) of vegetables continue to be sold in traditional chains where traders dominate and control the bulk of produce transaction in between farmer and consumer by sitting in the markets. On the other hand, twenty five percent (25%) of the vegetable produce get sold through the modern chain where the major role get played by

mall, fresh vegetable stores, fast food chains and restaurants. This share is expected to increase as consumers demand for convenience and ready-to-cook vegetable is increasing day by day. The flow of vegetables with the different features of conservative and modern chain has been discussed.

#### LITERATURE REVIEW

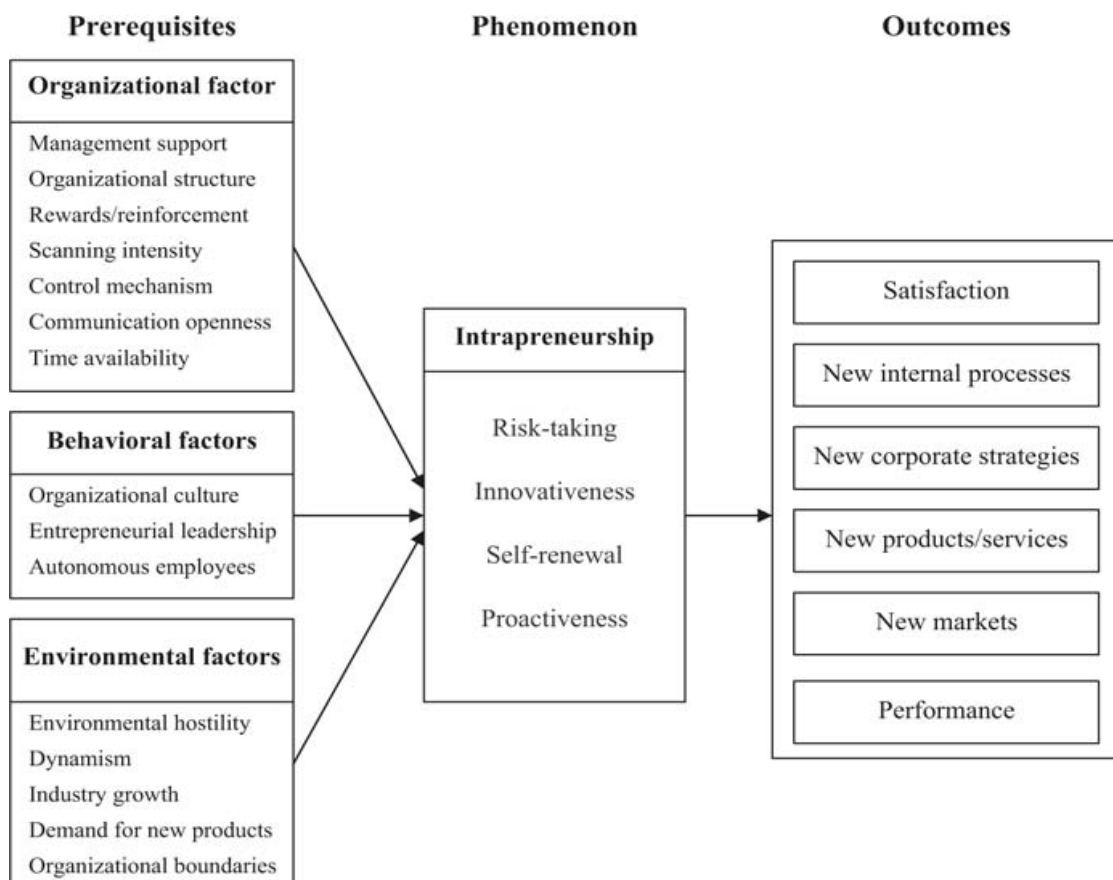
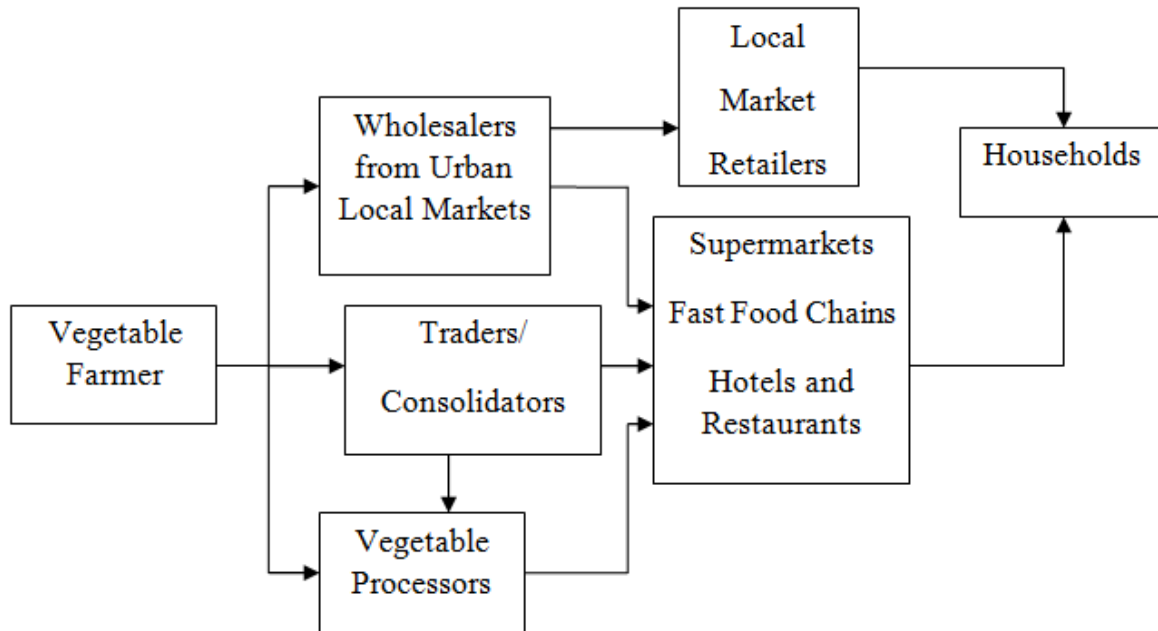
The characteristics of agriculture like orientation for growth, optimism and personal control on activities gives a farmer entrepreneurial identity stated by the research of Vesala, K., M., Peura, J., McElwee, G. [1] and says agriculture is the most entrepreneurial activity. The transition has taken it from entrepreneurial activity to intrapreneurial activity. The food security has been a challenging assignment for the world, so agriculture is getting linked with food processing and expected to be a major step for global food security. Every country of the world needs to participate in the game of food security. In this era of globalization only the control over subsidies and import policies for food market is not enough. For the expansion of agriculture as an industry, it must get backed by industrialization and agricultural marketing as the model is one way to implement this. Marketing is a bigger issue for the new agricultural farms is the conclusion of the research by McElwee, G., Anderson, A., Vesala, K [2]. Furthermore the research of McElwee, G., Anderson, A., Vesala, K. [2] emphasis on various factors important for agricultural marketing are situational factors, entrepreneurial skills and attitudes of the farmer. As for any business entrepreneurial and managerial expertise is need, so the same with the agricultural sector as well. We can say them two

different dimensions that give strong reasons for the success or failure of any farming enterprise.

There is another parallel view by Boselie, *et al.* [3] referred to the low cost strategy as chain optimization where satisfying and segmenting the

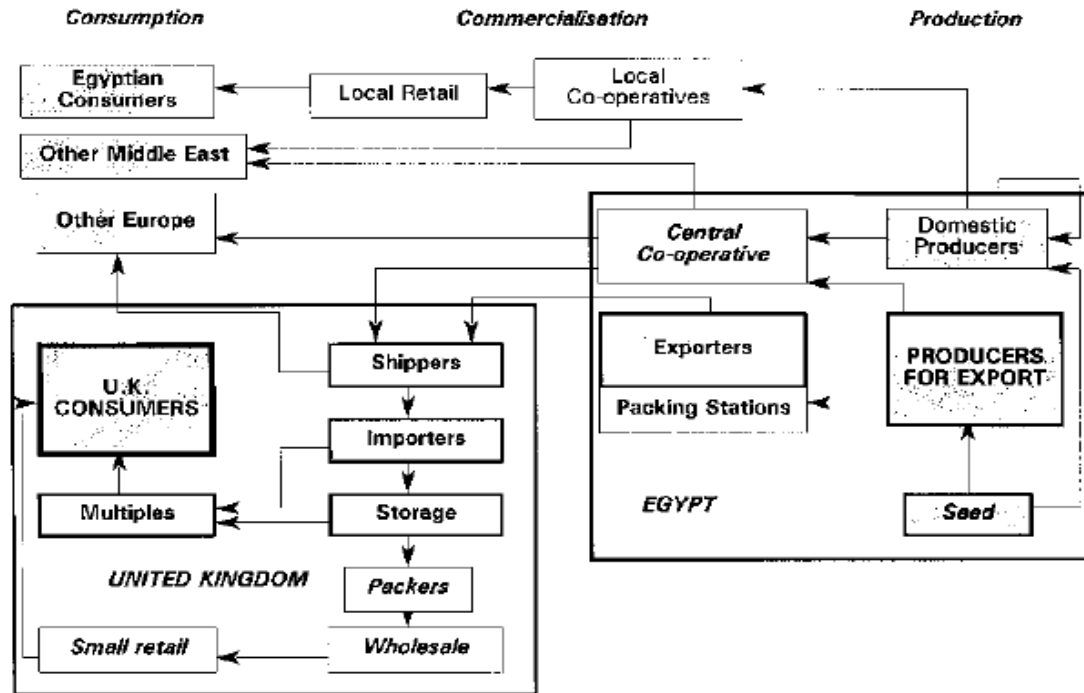
markets are most important for the innovation and optimization called the integral chain care and chain differentiation.

**Conservative Chain vs. Modern Chain**



Source: Adopted from Asef and Iraj (2011)

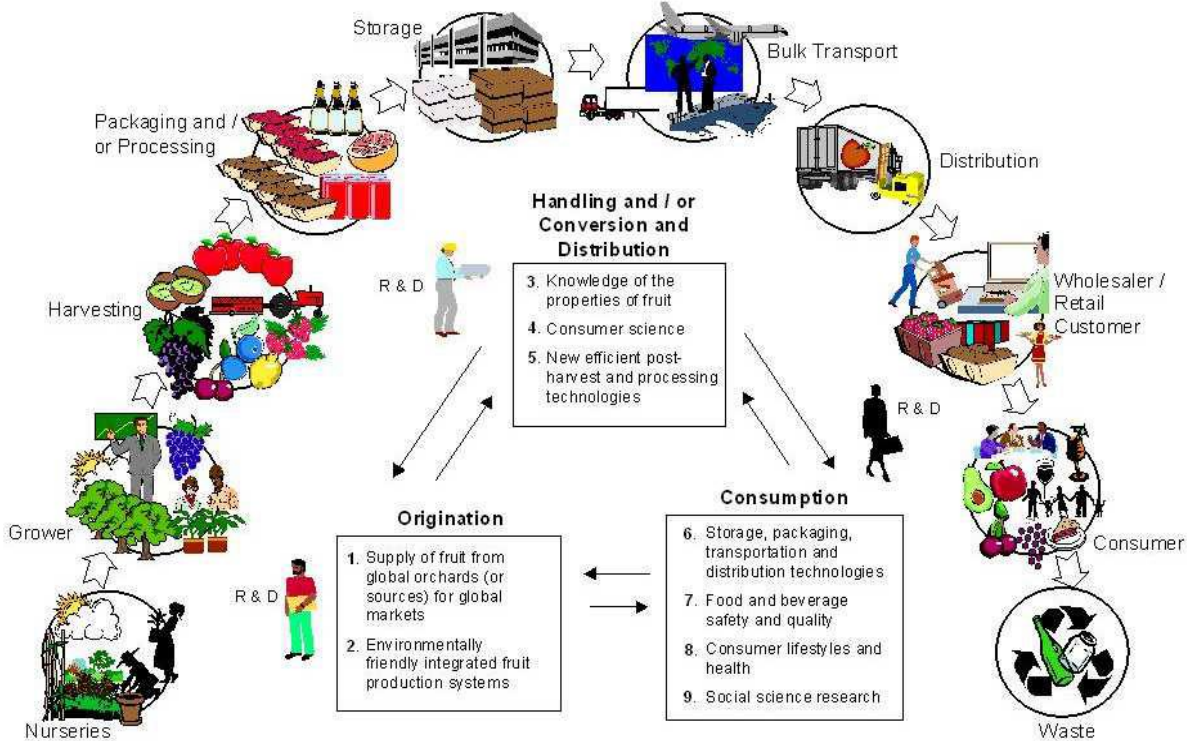
**Agribusiness Entrepreneurial Model**



Source: Adopted from Loader, R [4]

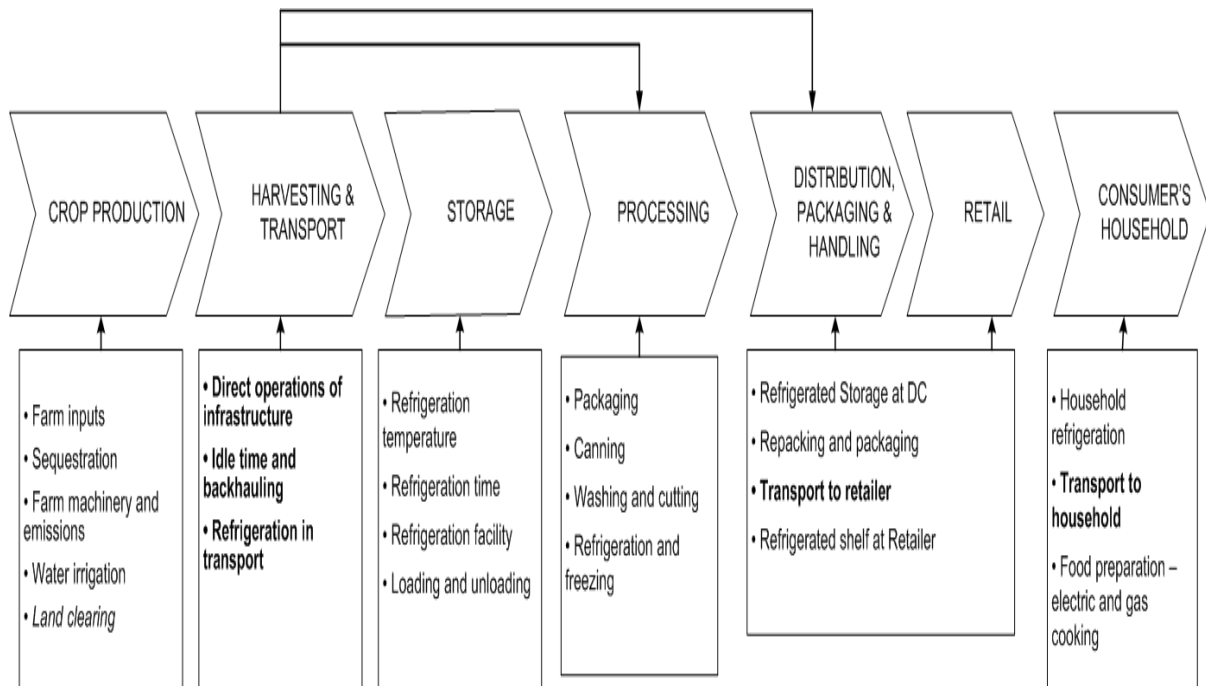
### World Food Distribution

### Science and Technology Issues for the Fruit Industry



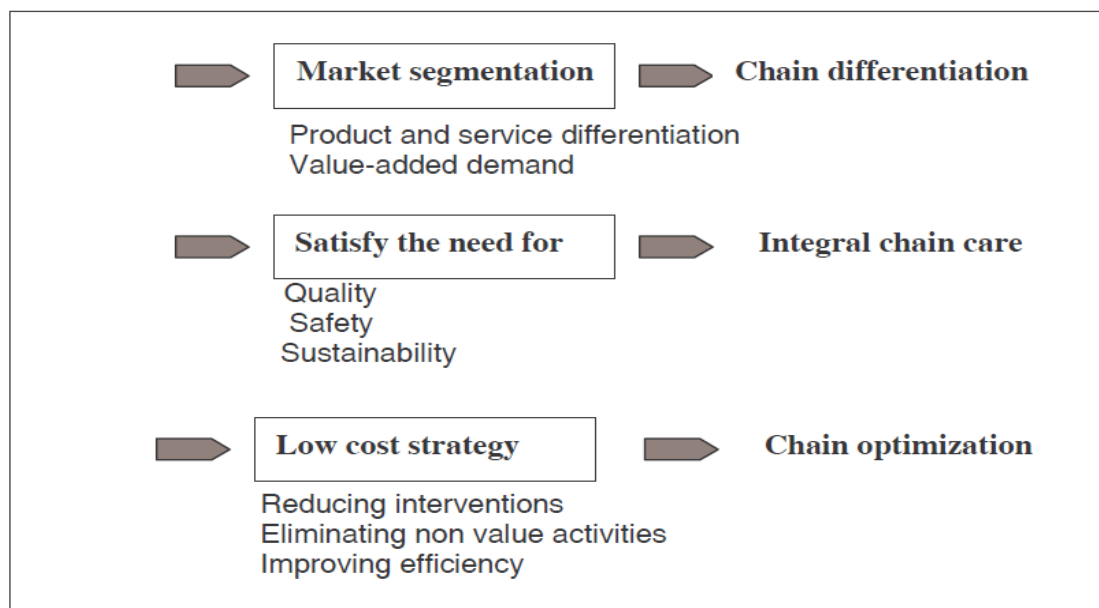
Source: Supply Chains in New Zealand Horticulture

### Fruit Industry Supply Chain



Source: [www.anra.gov.au](http://www.anra.gov.au)

### Agricultural Supply Chain in Australia



Source: Boslie [3]

### Food Supply Chain Strategies

Furthermore the research of McElwee, G., Anderson, A., Vesala, K. [2] emphasis on various factors important for agricultural marketing are situational factors, entrepreneurial skills and attitudes of the farmer. As for any business entrepreneurial and managerial expertise is needed, so the same with the agricultural sector as well. We can say them two different dimensions that give strong reasons for the success or failure of any farming enterprise. The organization follows a designed network for production and distribution from inception to its consumption

called a supply chain. The main goal of supply chain is to maximizing values (Sparling and Duren 1998), by coordination and control of all activities within a supply chain that can lower down the transaction costs and with increasing margins [5]. To improve the performance the dimesions like time, quality, flexibility, cost, and environment should get improved [6].

#### Issues with Agriculture

Information is one of the most important aspects for the growth of agricultural sector and very essential to

develop an appropriate agricultural information system that can support both the agricultural information and the development and training of agricultural information specialists. Discussion of the paper of Thapisa, A.P.N.[7] gives an insight of the need of program that can provide the necessary professional training. The stability in agricultural development can get done systematically only on stressing the development of existing agricultural libraries and it is needed to be empowered. The importance and need of a regional network also cannot get ignored for the speedy delivery of information to all the needy users. The method of communication of agricultural information by Oduwole, A. A., Okorie C. N., [8] is also expected to go through the research and is crucial to enabling farmers make informed and decisive decision. In order to make agricultural extension much more effective the information providers such as librarians, agricultural extension workers and village heads/chiefs and the Commission should also emphasize the importance of functional agricultural extension services covering in-service training, continuing education, on-farm adaptive research, evaluation and monitoring of extension services and the establishment of media resource and communication centers [8]. The ability of the nation to get the higher yield of produce completely depends on the ability of the country to explore and sharing of the updated information with the community. Research of Kiplangat, J. [9] says that the rural populations of developing economies suffer from poverty and the agricultural advancement can help them to eradicate poverty. At the same time information distribution system must work very aptly. By 2020 Kenya is being a highly industrialized country and this can get achieved only by the development of agriculture and rural sector. There is strong need to explore the different ways of communication development to support agriculture [9].

The findings of the study [10] demonstrate the importance and degree of need for knowledge and information moreover reveals the farmer's tendency for the information seeking patterns though much of research done and paper published and availed as print materials has very negligible use due to their unavailability and illiteracy. As per the research study by Lwoga, E.T., Stilwell, Christine, S. and Ngulube P. [10], Radio and cell phones have been a good source of information sharing compared to advanced technologies (i.e. internet and e-mail) having less importance for farmers. Farmers also believe that they should come forward to access agricultural information and knowledge available at different sources. The paper [11] has tackled the problem of developing an effective market information system. Policy makers should consider the provision of agricultural extension services and the susceptibility of food output to rainfall should get addressed by both government and producers. Kalusopa, T. [12] says that utilization of information is necessary for agricultural development activities, but effective information has to be systematically collected,

organized and repackaged and must be available in easily accessible source as and when needed. As the study shows, the information in the agricultural sector is scattered, poorly developed and unfocused [13]. In order to improved agriculture, it is needed to have a well-organized and functional integrated information delivery system to provide information that must be timely available with relevancy, accuracy, and reliability with in desired usable forms [12]. There is a need to redesign the information support system for agricultural development. There can be much of possibility for creating small-scale irrigation systems and development in losses due to heavy rainfall with support of government can get explored. Authors Ocran, M. K., Biekpe, N. [11] suggests tackling all the problems together will help in reducing the transaction cost of producers and can make the produce cheaper for the end market and consumers.

The research carried by Abe S, Ebihara T *et al.* [14] has given a huge source for the agricultural research to get the secondary data available globally for a wider and deeper understanding of the subject [15]. The websites are with the information of past and current scenario of horticulture, farming, agronomy, agricultural production, agricultural development, agricultural policy and sustainable agriculture. The very informative websites are available with full of information [14] and the information is in English and really it is of high importance. In agriculture, it is very difficult to say [16] a single correct answer for any of the problem, the reason is, it depends on many variables and most of them are uncontrollable. Agricultural produce supply chain facing many of the challenges in Sub-Saharan Africa and Ghana but the research of Ocran, M. K., Biekpe, N. [11] exclusively talks about the need of the improvement in the reduction of transportation cost and can get done by improving the quality of roads reaching to farms and agricultural producing areas. The observation concludes that since agriculture is the science of locality so approach should be very justified. Long term strategies are needed to account the heterogeneity of agriculture [17].

## RESEARCH METHODOLOGY

The study is quantitative in nature, though the base formulated is completely a summary of qualitative study. A self-prepared instrument used for collect data where five vegetables got consideration for the better understanding of the business [18]. The study is conducted in Odisha state of India and main respondents are the vegetable distribution channel intermediaries. All together a sample of 756 participants of vegetable supply chain included in study. The cluster sampling method of probability sampling is used, since supply chain participants are living in clusters as markets or villages. The research methodology is directly concerned with solving the problem lying with the agricultural supply chain specifically study on intermediaries.

## Data Analysis

## One way ANOVA showing the significant impact of Yearly Earning on factors of Volumes and Flows 1 for Intermediary

ANOVA						
		Sum of Squares	df	Mean Square	F	Sig.
No. of Customers Last Week for Potato	Between Groups	20.511	5	4.102	3.666	.003
	Within Groups	840.287	751	1.119		
	Total	860.798	756			
No. of Customers Last Week for Brinjal	Between Groups	26.653	5	5.331	3.177	.008
	Within Groups	1259.918	751	1.678		
	Total	1286.571	756			
No. of Customers Last Week for Cabbage	Between Groups	29.175	5	5.835	4.201	.001
	Within Groups	1043.192	751	1.389		
	Total	1072.367	756			
No. of Customers Last Week for Cauliflower	Between Groups	34.469	5	6.894	3.904	.002
	Within Groups	1326.077	751	1.766		
	Total	1360.547	756			
No. of Customers Last Week for Okra	Between Groups	21.852	5	4.370	2.805	.016
	Within Groups	1170.206	751	1.558		
	Total	1192.058	756			
Fluctuation in No. of Customers on Different Weeks for Potato	Between Groups	59.401	5	11.880	5.575	.000
	Within Groups	1600.277	751	2.131		
	Total	1659.678	756			
Fluctuation in No. of Customers on Different Weeks for Brinjal	Between Groups	14.712	5	2.942	1.857	.100
	Within Groups	1190.083	751	1.585		
	Total	1204.795	756			
Fluctuation in No. of Customers on Different Weeks for Cabbage	Between Groups	5.004	5	1.001	4.545	.000
	Within Groups	165.381	751	.220		
	Total	170.386	756			
Fluctuation in No. of Customers on Different Weeks for Cauliflower	Between Groups	3.979	5	.796	3.687	.003
	Within Groups	162.079	751	.216		
	Total	166.058	756			
Fluctuation in No. of Customers on Different Weeks for Okra	Between Groups	6.700	5	1.340	2.765	.017
	Within Groups	363.997	751	.485		
	Total	370.697	756			
Change in Sales Last Week for Potato	Between Groups	65.787	5	13.157	6.347	.000
	Within Groups	1556.929	751	2.073		
	Total	1622.716	756			
Change in Sales Last Week for Brinjal	Between Groups	18.189	5	3.638	2.030	.072
	Within Groups	1345.711	751	1.792		
	Total	1363.900	756			
Change in Sales Last Week for Cabbage	Between Groups	2.427	5	.485	1.102	.358
	Within Groups	330.983	751	.441		
	Total	333.411	756			
Change in Sales Last Week for Cauliflower	Between Groups	8.013	5	1.603	2.710	.019
	Within Groups	444.129	751	.591		
	Total	452.143	756			
Change in Sales Last Week for Okra	Between Groups	3.551	5	.710	1.022	.404
	Within Groups	522.055	751	.695		
	Total	525.606	756			
Reason for Change in Sales for Potato	Between Groups	38.905	5	7.781	3.858	.002
	Within Groups	1514.638	751	2.017		
	Total	1553.543	756			
Reason for Change in Sales for Brinjal	Between Groups	14.116	5	2.823	1.757	.119
	Within Groups	1206.783	751	1.607		
	Total	1220.898	756			
Reason for Change in Sales for Cabbage	Between Groups	2.038	5	.408	2.144	.058
	Within Groups	142.731	751	.190		
	Total	144.769	756			
Reason for Change in Sales for Cauliflower	Between Groups	.785	5	.157	.625	.680
	Within Groups	188.468	751	.251		
	Total	189.252	756			
Reason for Change in Sales for Okra	Between Groups	3.265	5	.653	2.160	.057
	Within Groups	227.034	751	.302		
	Total	230.299	756			

## FINDINGS AND CONCLUSION

One way ANOVA showing the significant impact of yearly earning of the intermediary on factors of volumes and flows 1, study carried with 757 respondents on the basis of data collected through structured questionnaire on 20 variables and the one way ANOVA statistical test by Brown, M., Forsythe, A., [19] applied among 20 variables namely no. of customers last week for potato, no. of customers last week for brinjal, no. of customers last week for cabbage, no. of customers last week for cauliflower, no. of customers last week for okra, fluctuation in no. of customers on different weeks for potato, fluctuation in no. of customers on different weeks for brinjal, fluctuation in no. of customers on different weeks for cabbage, fluctuation in no. of customers on different weeks for cauliflower, fluctuation in no. of customers on different weeks for okra, change in sales last week for potato, change in sales last week for brinjal, change in sales last week for cabbage, change in sales last week for cauliflower, change in sales last week for okra, reason for change in sales for potato, reason for change in sales for brinjal, reason for change in sales for cabbage, reason for change in sales for cauliflower and reason for change in sales for okra. Out of these 14 variables showing the p value less than or equal to 0.05 shows that there is statistically significant difference between the opinions of respondents, though 6 variables are having p value more than 0.05 shows that there is no statistically significant difference between the opinions of respondents. The majority of variables are not getting difference in opinion by Montgomery, D.C., Runger, G.C. [20].

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