

A Proposed Agile Based Supply Chain Model for Poultry Based Products in India

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Abstract: The poultry industry in India represents a major success story. With rapidly changing lifestyles, affluent culture and a conscious need for general wellness, Indian consumers are now opting for a more protein-rich diet. From a plot scheme, it has made a quantum leap to become as a dynamic industry. The present decade promises to exploit value added products and the global trade avenue. This paper explores the existing supply chain model of poultry-based products in India. The study is focused on two contexts: the issues faced by poultry farmers in selling the products and retailers' perspective on the other end. In the current Supply Chain model there is no transparency between the stakeholders which leads to high yield losses, increase in price and uncertainty in the supply and demand analysis. Poultry farmers are paid very less for their product whereas consumers pay huge amount for the same product and there is a lack of technology and financial support for the poultry producers. In our proposed model, we introduce "Agile Based Supply Chain Model for the Poultry Based Products" which will integrate and increase the transparency among the stakeholders in the supply chain and eliminate the mediators and meet out the market demand. Poultry farmers details are updated in the e-commerce platform and these details are transferred to the retailers by the agile team. Support group for poultry farmers and retailers are the two ends of Supply Chain coordinated by agile team.

Key words: Agile, supply Chain, poultry based products, e-portal, poultry farmer and retailer support group

INTRODUCTION

Poultry plays an important role in the Indian economy. Annual per capita consumption in India is only 42 eggs and 1.6 kg of poultry meat, which is below the levels recommended by the Nutritional Advisory Committee 180 eggs and 10.8 kg of poultry meat. Egg being an excellent source of proteins is fast becoming a favorite among urban Indians. The layer segment in India is all set to grow and is currently estimated at Rs. 10,000 Crores (INR 100 billion). According to the Ministry of Agriculture, India's egg production is estimated at 47.3 billion eggs per annum. Today, with more and more 'Eggitarians' on the rise, egg consumption is growing at 8-10% annually. Egg production at the end of Ninth Plan (2001-02) was 38.7 billion as compared to 21 billion during 1990-91. India, with 46.2 billion egg production in 2005-06, ranks third in the World as per FAOSTAT. India's egg production was 51 billion and rank fifth in production of chicken meats during 2006-07 (BPI, 2014). In India the poultry sector has been growing at a much faster rate than other sectors of the Indian economy and accounts for 100 billion rupees to the Gross National Product (GNP). In spite of such astonishing growth in last three decades, in India use of 28 eggs and 0.8 kilograms of poultry meat annual per capita in 2000 is

low as compared to the world average of 147 eggs and 11.1 kg of poultry meat on a per capita basis (FAOSTAT). As per Business Portal of India (BPI) report the layer and meat consumption rate is increased to 55 eggs and 2.8 kg of meat on a per capita basis in 2012 in India. The year wise details are shown in Table 1 and Fig. 1.

Supply chain management and poultry business: The paper mainly focuses on existing supply chain management in Indian poultry and its challenges. Supply chain management is the flow of goods, services, information and money from the source materials all the way to the consumer (ShriHarun, 2012; Qi Yi-nan and Chu Zhao-Fang, 2009). Food chain logistics is a significant component within logistics system as a whole. The food sector plays a significant role in economy, being one of the main contributors to the GNP of many countries, particularly in developing countries (Girma Gebresenbet and Techane Bosona, 2012). It has been observed that there is a wide divergence between the farm gate prices and retail prices of various food items, where the producer sells for one rupee becomes one rupee thirty paise when it reaches the final customer, its due to the presence of intermediaries (ShriHarun, 2012). There is a lot of

Table 1: Year wise consumption rate of layer and meat

Year	1980	1985	1990	1995	2000	2005	2010
Layer	5	9	14	20	28	41	55
Meat	0.2	0.3	0.5	0.7	1.9	2.3	4.9

Table 2: Servings of suguna according to 2014

States covered	16
Villages covered	8000
Number of farmers in suguna	20000

demand for poultry products in the country and due to the various pitfalls sensed at various states of supply chain, the demand could not be fulfilled and thus the supply chain plays a major role in the poultry process.

Role of information technology in poultry supply Chain:

Internet is a quick and less expensive mode of communication for remote villages as compared to traditional communication services and telephones, so it is necessary to equip our poultry farmers with the technology. IT can be used as a vital tool to can maintain updates and enrich database of the Indian poultry system as a whole. IT not only can help poultry farmers with the information of roof enrichment, feed selection, weather report but also demand-supply status of various poultry products as well. Many corporate companies like Suguna Poultry, SKM Egg Products Export (India) etc. have invested in R and D and may provide assistance to the poultry farmers in order to cater to the needs of necessary storage and warehousing facility with the help of IT (GOI, 2013; Shrishail Shirur, 2014).

Agile based supply Chain system in poultry based industry:

The supply chain objective is to deliver the right product, in the right quantity, to the right place, at the right time, for the right cost (Erich Schmidt Verlag, 2012). Agility has been defined as the ability to succeed and prosper in an environment of constant and irregular change. An agile supply chain is an integration of business partners to enable new competencies in order to respond to rapidly changing, continually fragmenting markets. The key enablers of the agile supply chain are the dynamics of structures and relationship configuration, the end-to-end visibility of information and the event-driven and event based management (Agarwal *et al.*, 2007). The main key components of agile capabilities are considered to be speed, quality, flexibility and responsiveness in the poultry product industry (Vonderembsc *et al.*, 2006). The main component used in the proposed system will follow process integration. Process integration means collaborative working between buyers and suppliers, joint product development, common systems and shared information. Application of the process integration concept helps to find out the solutions for three sources of demand uncertainty in the poultry i.e., seasonality, growth life cycle and end-customer demand.

ANALYSIS OF SUPPLY CHAIN MODEL

Existing supply Chain model in poultry industries:

Poultry in India lacks in various aspects as compared to its global counterparts. Reason for this state is the inefficiency of traditional or existing supply chain model as mentioned in the Fig. 2. Traditional model comprises many stages, its leads to post-produce losses and degradation in quality of farm products. Innumerable intermediaries in these stages cause increase in the price of products which compels customer to pay more, without benefitting poultry producers. In addition to these one of the economic activities related to poultry products is logistics. Various stages in logistics are purchase, transportation, storage, loading and unloading, packing, distribution, retail and information activities (Mo Lianguang, 2014). India's poultry system lacks in proper transportation and storage facilities. Due to lack of storage facility, millions of poultry meats and eggs are wasted every year. Unorganized flow of information regarding demand and supply of farm products leads to thoughtless production by poultry producers.

Case study of suguna foods limited in India:

Suguna saw an opportunity for business growth by helping the poultry farmers who had bought feed and medicines on credit and could not clear their dues. To help them recover their money, these visionaries began to provide feed and health support to indebted farmers in return for the end product-eggs. Suguna's network is growing enormously with over 20,000 farmers. Started with the vision to 'Energise Rural India', Suguna has successfully enriched the lives of many rural households. Pioneering the poultry integration or contract farming model, Suguna's presence is well established in 16 states and 8000 villages across the country shown in Table 2. With intent to provide quality support and deliver quality products to end consumers, Suguna invests heavily in technology research and development. Over a period of 25 years, Suguna has mastered the art of cost and productivity optimization (Suguna, 2014). Company owned feed mills, research and development centers, training programs, processing plants, hatcheries, efficient supply chain management, technology infrastructure are indicators that you need not look outside when you are part of Suguna's family of successful poultry farmers. Similarly SKM egg products started the journey of eggcellence in 1996 with the state of the art production facility comprising best of methods and technology which are in line with international level. SKM egg products is one of the largest egg processing plant in Asia with a capacity to process 1.8 million eggs/day to produce 6500 tones of egg powder annually (SKM, 2014).

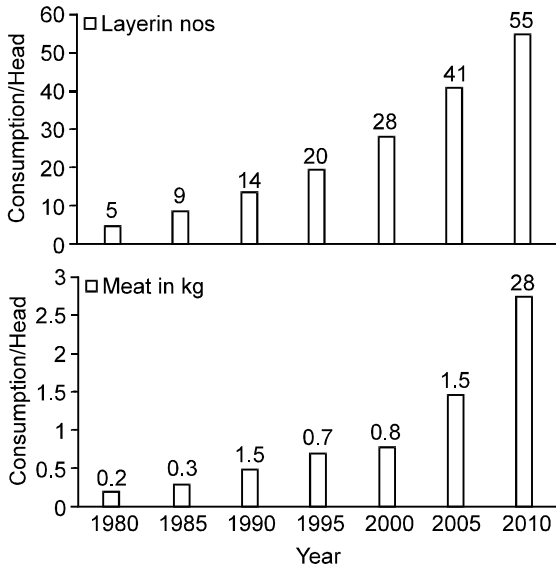


Fig. 1: Consumption rate of poultry products in India

National Egg Co-ordination Committee (NECC) is taking most significant steps to uplift all the levels of poultry organizations in Indian poultry sectors. In the traditional model of poultry, there was no transparency among the various stakeholders and no price realization by the poultry producers. National Egg Co-ordination Committee caters with all these deficiency of the traditional model. The main objective of this program was to remove the intermediaries and to maintain the quality and rate of the products comparable to global standards. Like Suguna and other similar organizations provide a platform to small as well as large players to sell their products through them. Tamilnadu Poultry Farmers Association (TPFA) provide information like daily market prices, weather reports, global prices, best farming practices, water, other chain reaction testing etc, These information's are collected by NECC from various sources such as Meteorological Department, Veterinary Universities, local markets etc and upload on their website (Sazzad Parwez, 2014). By this information poultry farmers are able to know the status of their product.

Why agile as a supply Chain strategy for Indian poultry farms: The ability of a system to adapt to change and rapidly reconfigure in response to market opportunities becomes crucial (Zsifkovits and Engelhardt-Nowitzki, 2007). To make the poultry to adopt and inherit the various changes in the supply chain pattern, agile methodology can be used to improvise the poultry system. The agile methodology was very much popular in the software development process. The agile process followed in the software development can be used in the other industries where there is a need for iterative

release and changing requirement (Hamed and Abushama, 2013). The poultry farmers are producing various poultry products in various quantities and the retailers demand also changes across time. On the other end the poultry farmers are not able to sell the products for a good price. They are selling their product to various intermediaries. There exists a changing requirement from the retailers end and the poultry farmers are also not able to sell all their products to a single seller. To overcome this difficulty, agile approach will be very much suitable to tackle this situation. The scrum is an agile methodology which follows the project management approach (Malik Hneif, 2009). There are various roles in the project development of scrum like product owner, scrum master and team members. In our proposed model these roles will take care by poultry officers, banking professionals and technical expert. The team may work together in an iterative approach in sprint to deliver the product from Poultry farmers to Retailer in the supply chain and create a transparency in the system flow. The sprint is the short span of 2 weeks in the agile approach where and for every sprint; the demand for any poultry product in that period will be discussed and dispatched to the retailers in a required quantity.

PROPOSED MODEL FOR AGILE SUPPLY CHAIN

Role of agile team in supply Chain: In the proposed model as mentioned in Fig. 3, we have introduced the agile methodology using scrum in the supply chain for the Indian poultry industry. Our main aim is to eliminate the intermediaries in the supply chain, so that the poultry farmers are paid properly for the products they produce and also to create demand based supply chain model for the poultry products. The agile team in our proposed model will be coordinating with all the people in the supply chain and create a transparency between the stakeholders of the supply chain. The agile team will conduct a sprint meeting with all the members of the team. The team consists of Scrum Master who will keep the team members focused to attain the goal (Mohammed Abdul Bari, 2011; Cristal *et al.*, 2008) and make sure the coordination between the Poultry Farmers Support Group (PFSG) and Retailer Support Group (RSG). The RSG who will ensure to deliver the poultry products to the retailers. The PFSG persons who will be helping the poultry farmers in terms of finding the banks for loan facility and gathering the other information based on necessities, members from poultry department and bank. The scrum master will conduct meetings with all the persons in the agile team for each sprint to resolve the issues and to create transparency in the system. The RSG and PFSG will be integrating the retailers and poultry farmers in the agile system. The main points which are to be discussed in the sprint meeting:

- 1: Discussion about the demand and supply of poultry products. The poultry farmers are able to understand about the demand for various poultry products so that they can produce the products that have high demand
- 2: The banking personal can interact with the PFSG on loan facilities to the poultry producers
- 3: Information related to yield, weather; pricing analysis based on supply and demand, logistics, storage and other issues are to be discussed

The main advantage of having this agile approach will help the poultry farmers to supply right amount for their poultry products which they produce, eliminate the intermediaries and allows the direct marketing of poultry farmers products. The poultry farmer support group (PFSG) will be located nearby to the farmer place where the poultry farmers can directly contact the PFSG persons for any enquiry. Information will be transferred by the agile team to the poultry farmers through PFSG. The Agile team will study the supply and demand pattern prevailing in the country for all types of poultry products. They also identify the poultry farmers group who are producing the poultry products and send these data to the knowledge base system. Knowledge management is "A method that simplifies the process of sharing, distributing, creating, capturing and understanding the company knowledge" (Mohammed Abdul Bari, 2011). Knowledge based system consist of all the information that has happened earlier and takes help from these situations to cater the present need in a best possible way. Knowledge based system plays a vital role in every sectors as some information's are required to strengthen the decision. The knowledge based system provides solution to the agile team during the demand for the poultry products or any other information needed. Whenever there is a demand for particular poultry product, the knowledge system identifies which farmer group can satisfy the demand for the retailers and provides those details to the agile team.

Retailers perspective: From the Retailers perspective, each retailer has to register their details in the poultry e-Help portal through RSG. The Retailer Support Group is the representative of the retailers. The RSG specifies their demand to the agile team and based on that demand the agile team finds the farmer group and pass the corresponding information to the poultry farmers who will be able to meet the demand through PFSG. The poultry farmers produce various types of poultry products. The PFSG collects this information from poultry farmers and send it to the agile team. The agile team updates all these details in the Poultry e-Help portal and knowledge base system as mentioned in the Fig. 3. The agile team may get the input from various sources such Government of India, department of poultry

science and metrological department, veterinary universities for information processing. Whenever there is a demand for a particular poultry product raised by the retailer, the poultry farmers who can meet out the demand are identified and duly informed so that they can able to sell their product at right time. The RSG team seeks the help of the third party logistics to transform their products to the retailers end. The third party logistics enterprises provide (s) the logistics business activities such as transportation, storage, unloading and conveying, packing circulation, processing and distribution (Zhaojiang Dong, 2013). The agile team is helpful in transfer the poultry product information's from PFSG to RSG.

Agile team life cycle: The agile team can follows the Plan, Do, Check and Act (P-D-C-A) cycle approach in the supply chain.

Plan: The agile team initially analyzes the supply and demand requirement from the poultry farmers and retailers who have registered in the Poultry e-Help portal regarding the demand for the various poultry products.

Do: Get the details of the poultry farmers who can meet the demand requirement from the knowledge base and pass the information to the corresponding poultry farmers through PFSG. The RSG gives the information about the poultry products to the retailers through 3rd party logistics system. Then the retailers can sell their products to the respective customers.

Check: Check if there is any discrepancy in the system flow by conducting the agile meetings.

Act: Take the corrective actions if there is any feedback from the various stakeholders of the system.

Regulative measures of poultry product logistics based on the supply Chain: We are proposing a third party logistics environment where professional logistics enterprises, RSG and FSG are the main bodies of business flow. The service of the third-party logistics customize logistic services according to the customer requirements and strives for the customer satisfaction. The third party logistics has powerful information collecting ability using the information network system.

Messaging service for the poultry producers: A separate messaging service is arranged for the poultry farmers to get the details of poultry products that have high demand. The automatic response system is a feature that is enabled through mobile phones by sending short codes to the destination mobile which will (is) be connected to the application server as mentioned in the Fig. 3. The application server gets the information

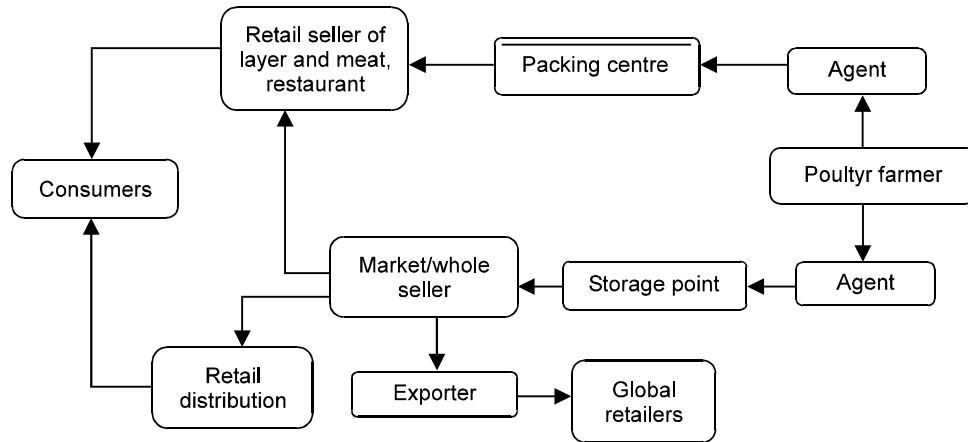


Fig. 2: Existing supply Chain model of Indian poultry product

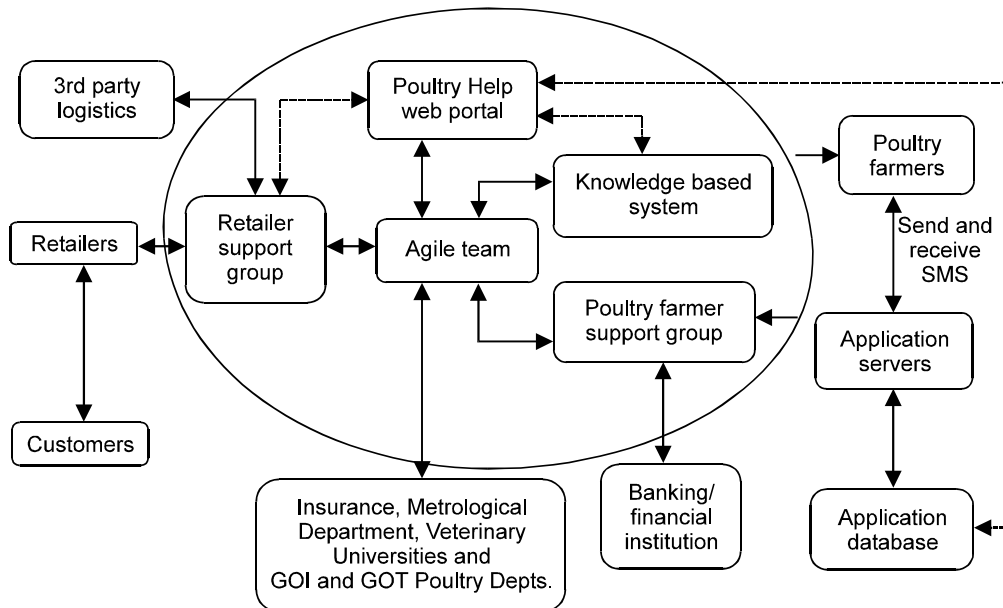


Fig. 3: Proposed model of agile based supply Chain for Indian poultry products

from the database for the corresponding short code sent and an immediate SMS to the receiver (Prabhat Kumar Singh *et al.*, 2014). The poultry farmer has a separate code for individual poultry products for example AA-Egg, BB-Meat and CC-Broiler etc. The farmer can send a SMS with short code to the corresponding mobile number and an immediate response will be given to them regarding the demand availability in long SMS in local language.

Conclusion: When we are exploring poultry based supply chain in the Indian poultry industries, the integration of stakeholders in supply chain is considered as an important factor. Some of the important factors for small scale poultry farmers such as supply-demand pattern, storage facilities for the poultry products,

financial support, post yield losses, transportation and technology support need to be addressed in the poultry supply chain. In our proposed model, we have addressed all these issues using the agile based supply chain. To achieve success in the agile based supply chain, the system should adapt to changes immediately and stakeholder should possess the knowledge about the various stages of the supply chain and share the information at the right time to sustain the agility in supply chain.

ACKNOWLEDGEMENTS

Authors are grateful to Er. A.C.S. Arunkumar, The President, Dr. M.G.R. Educational and Research Institute University, Chennai, Tamilnadu, India for providing research facility and also thank Suguna Foods Limited

and SKM Egg Products Export (India) Limited for sharing the details in their online portal to make this research model as a successful one.

REFERENCES

- Agarwal, A., R. Shankar and M.K. Tiwari, 2007. Modeling agility of supply chain. *Industrial Marketing Management*, 36: 443-457.
- BPI, 2014. Business Portal of India, Entrepreneurship in Agriculture and Allied Sectors, Government of India <http://business.gov.in/agriculture/index.php>.
- Cristal, M., D. Wildt and R. Prikładnicki, 2008. Usage of SCRUM Practices within a Global Company. *Global Software Engineering, ICGSE 2008 IEEE Int. Conference*, pp: 222-226.
- Erich Schmidt Verlag, 2012. *Innovative Process Optimization Methods in Logistics: Emerging Trends*, 45: 267.
- GOI, 2013. National Statistical Commission, Ministry of Statistics and Programme Implementation, New Delhi published in the year of 2013 available http://mospi.nic.in/Mospi_New/upload/nsc_rep_st_at_agr_allied_sec.pdf.
- Girma Gebresenbet and Techane Bosona, 2012. *Logistics and Supply Chains in Poultry and Food, Pathways to Supply Chain Excellence*, Dr. Ales Groznik (Ed.), ISBN: 978-953-51-0367-7.
- Hamed, A.M.M. and H. Abushama, 2013. Popular agile approaches in software development: Review and analysis, "ICCEEE", IEEE conference publication, pp: 160-166.
- ICMSE, 2009. IEEE Conference Publication, DOI: 10.1109/ICMSE.2009.5317307, pp: 534-540.
- Mo Lianguang, 2014. Study on Supply-Chain of Poultry Products Based on IOT. Sixth International Conference on Measuring Technology and Mechatronics Automation, 2014.
- Malik Hneif, SiewHockow, 2009. Review of agile methodologies in software development. *Int. J. Res. and Rev. in Appli. Sci.*, Volume 1, Issue 1, October 2009.
- Mohammed Abdul Bari and Shahanawaj Ahamad, 2011. Managing Knowledge in Development of Agile Software. *Int. J. Adv. Computer Sci. and Applic.*, 2: 4.
- Prabhat Kumar Singh, Diljeet Singh Chundawat and Roopesh Kumar, 2014. Automatic Response System Using SMS. *Int. J. Engineer. Res. and General Sci.*, Vol 2, Issue 2.
- Qi Yi-nan and Chu Zhao-Fang, 2009. The impact of supply chain strategies on supply chain integration, *Management Science and Engineering*.
- SKM, 2014. Egg Products Export (India) Limited, 2014. Details published and available from in the web portal http://www.skmeegg.com/?page=about_us.
- ShriHarun, R., 2012. Food Inflation and Agricultural Supply Chain Management, 16th Conference of Global India held in Mumbai on September 22.
- Shrishail Shirur and SuwarnaTorgal, 2014. Recent Trends of Information Technology in Logistics and Supply Chain Management of Indian poultry Industry. Apr. Rajesh Panda, Management case study on, ITC's e-Choupal: A case study on Rural Marketing Initiative. *Int. J. Res. in Business Management*, 4: 95-100.
- Sazzad Parwez, 2014. Food supply chain management in Indian Agriculture: Issues, Opportunities and Further Res., 8: 572-581.
- Suguna Foods Limited, 2014. Available from web portal http://www.sugunapoultry.com/about_suguna/overview.asp.
- Vonderembsc, M.A., M. Uppal, S.H. Huang and J.P. Dismukes, 2006. Designing supply chains: Towards theory development. *Int. J. Prod. Economics*, 100: 223-238.
- Zsifkovits, H.E. and C. Engelhardt-Nowitzki, 2007. An analysis of frameworks for measuring supply chain agility. *Agile Manufacturing, ICAM 2007 IET International Conference*, IEEE conference publication, pp: 87-95.
- Zhaojiang Dong, 2013. The Technical Conditions of Modern Logistics. *Open J. Social Sci.*, 5 19-22.