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A CONCEPTUAL FRAMEWORK FOR SUSTAINABLE POULTRY SUPPLY CHAIN MODEL

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Abstract:
Now a day, sustainable supply chain is the crucially considerable matter for future focused industries. As a result, attention in supply chain management has increasingly amplified since the 1980s when firms discovered its benefits of mutual relationships within and beyond their own organization. This is why, concern researchers are trying hard to develop new theory or model which might help the corporate sector for achieving sustainability in their supply chains. This kind of reflection can be seen by the number of papers published and in particular by journal since 1980. The objectives of this paper are twofold. First, it offers a literature review on sustainable supply chain management taking papers published in last three decades. Second, it offers a conceptual sustainable supply chain process model in light of triple bottom line theory. The model has been developed by taking in-depth interview of an entrepreneur from a Poultry case industry in Bangladesh.

Key words: Sustainability, Supply chain Management, Poultry Farming

JEL classification: M1, R41

INTRODUCTION

Production procedures along with suppliers, stakeholders and customers are linked by information, material and capital flows. In line with the value of the product comes the environmental and social burden incurred during different stages of production (Corbett & Kleindorfer, 2003; Seuring & Muller, 2008). To uphold unharmed environment for the next generation, it is always crucial for the industry to maintain their optimum productions based on changing customers' demands. Besides that, Literature review suggests that organizational sustainability consists of three components: the natural environment, society, and economic performance (Elkington, 2004). These triple bottom lines of social, environmental and economic aspects are dealt in sustainability which is vital and acute to maintain by a company. It is always intricate for the corporates to combine sustainability and supply chain management involved with their production process in order to gaining sustainability. In Bangladesh, thousands of poultry farms have grown up through private ownership without getting adequate scientific knowledge on it. Lots of poultry owners practices triple bottom line of sustainability but not in organized way. There is plethora research works on it so that farmers or its stakeholders can understand what they should do for the effective sustainability within this industry.

LITERATURE

The *APICS Dictionary* describes the supply chain as the processes from the initial raw materials to the ultimate consumption of the finished product linking across supplier, user companies; and the functions within and outside a company that enable the value chain to make products and provide services to the customer (Cox, Blackstone, & Spencer, 1995). The Supply Chain Council (1997) uses different dimensional definition of "A term increasingly used by logistics professionals – encompasses every effort involved in producing and delivering a final product, from the supplier's supplier to the customer's customer. Four basic processes – plan,

source, make, deliver – broadly define these efforts, which include managing supply and demand, sourcing raw materials and parts, manufacturing and assembly, warehousing and inventory tracking, order entry and order management, distribution across all channels, and delivery to the customer" (Quinn, 1997). Once more, supply chain management is "an integrating philosophy to manage the total flow of a distribution channel from supplier to ultimate customer" (Ellram & M. Cooper, 1993).

Supply chain management has been defined by Mentzer (2002) as, "the systemic, strategic coordination of the traditional business functions and the tactics across these business functions within a particular company and across businesses within the supply chain, for the purposes of improving the long-term performance of the individual companies and the supply chain as a whole". According to Lummus and Vokurka, Supply chain can be stated as: all the activities involved in delivering a product from raw material through to the customer including sourcing raw materials and parts, manufacturing and assembly, warehousing and inventory tracking, order entry and order management, distribution across all channels, delivery to the customer, and the information systems necessary to monitor all of these activities. Supply chain management coordinates and integrates all of these activities into a seamless process. It links all of the partners in the chain including departments within an organization and the external partners including suppliers, carriers, third-party companies, and information systems providers (Lummus & Vokurka, 1999).

A focus on supply chains is a step towards the broader adoption and development of sustainability, since the supply chain considers the product from initial processing of raw materials to delivery to the customer. However, sustainability also must integrate issues and flows that extend beyond the core of supply chain management: product design, manufacturing by-products, by-products produced during product use, product life extension, product end-of-life, and recovery processes at end-of-life (Jonathan D. Linton, Robert Klassen, & Vaidyanathan Jayaraman, 2007).

Apart from supply chain, sustainability described as "the potential for reducing long-term risks associated with resource depletion, fluctuations in energy costs, product liabilities, and pollution and waste management"(Shrivastava, 1995a). Again, more micro-economic applications of sustainability have been investigated in the fields of management, operations, and engineering. Within the management literature, most of the existing conceptualizations of organizational sustainability have focused on ecological (e.g. the natural environment) sustainability, with only implicit recognition of social and economic responsibilities (Jennings & Zandbergen, 1995).

Above literature shown that number of research works have been done with sustainability, supply chain and sustainable supply chain management. But, there are some gaps in implementing this theory to the practical fields or particular industry or specific operation which might practice different way to implement as the environment differs from circumstances and location.

METHODOLOGY

The study covered literature review on supply chain, sustainability with triple bottom line, and Bangladesh Poultry Industry to understand realities of those matters. This paper used observation tool to generate sustainable supply chain process model for Bangladesh poultry in light of economic, social and environmental benefits and impacts. Both primary and secondary information have been used in this study. Primary information were collected from May 2011 to June 2011, mainly through in-depth interviews with the sample respondents. The total respondents were five business (poultry) entreprenuers who are having a long experience in this industry. The reason behind to choose them as sample respondents due to substantial knowledge on this industry. Secondary information like literature were collected from different published documents such as referral journal paper, survey reports, statistical yearbooks and NGOs reports.

BANGLADESH POULTRY AT A GLANCE

Bangladesh agriculture generates 19% of the GDP (BBS, 2003) and the contribution of the livestock sub-sector to GDP and the agriculture sector as a whole is currently 3.2% and 10.11% respectively ("Discovery Bangladesh," 2009). The information is showing much potential to develop as a commercial sector with employment and income generating opportunities both in the rural and urban areas. A large number of enterprises-cattle, poultry and dairy farms have grown in the private sector in recent years. As an important sub-sector of livestock production, the poultry industry in Bangladesh plays a crucial role in economic growth and simultaneously creates numerous employment opportunities. The poultry industry, as a fundamental part of animal production, is committed to supplying the nation with a cheap source of good quality nutritious animal protein in terms of meat and eggs. Approximately 20% of the protein consumed in Bangladesh originates from poultry. Among poultry species, the chicken population is dominant over others, at almost 90%, followed by ducks (8%) and a small number of quail, pigeons and geese. Free range 'backyard' and scavenging poultry, that are traditionally reared by rural women and children, still play an important role in generating family income, in addition to improving the family's diet with eggs and meat. Productive and reproductive performance of indigenous birds is relatively very low (35-40 eggs and 1-1.5 kg meat per bird per year) ("Cambridge Journal," 2009). In a condition, where majority of the people are landless, under privileged, malnourished, uneducated and poor, poultry rearing can play a very important role for income generation (Shamsuddoha, Quaddus, & Klass, 2011), poverty eradication, women empowerment, nutrition, food security and country's economical and development procedure.

POULTRY INPUT AND OUTOUT PROCESS IN BANGLADESH

Figure one in the below shows that feed, medicine & vaccines, skilled-unskilled-semi-skilled labors, management decisions, egg production values, mortality rates, utilities such as electricity, gas, water, transportation and government policy/decisions are the major input in the poultry industry in Bangladesh. These elements are extremely important for this industry as economic successes are depends on those. In the middle of the figure one is presenting the main process of this industry. Poultry industry starts from pure line breed which is top-secret breed conserved by major countries of France, Canada, USA, China and so. Bangladesh poultry industry begins from grandparent which is one step underneath of pure line breed. The supply chain can be enhanced from ultimate product of meat and eggs towards different processed food. This is the major scope of doing further research as well.

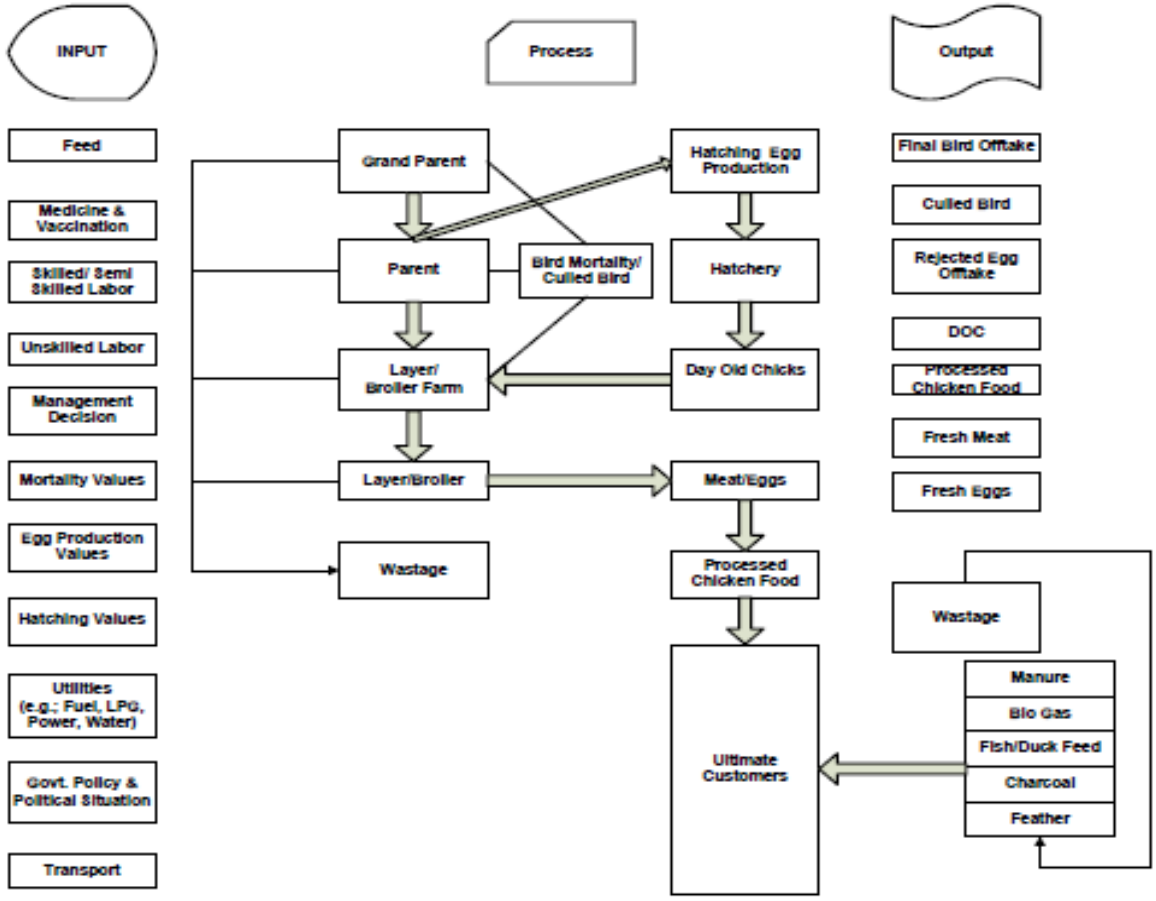

Figure 1: Schematic Representation of Poultry Input-Output Process in Bangladesh
Source: Interview

This phase generates lots of poultry wastes, typical poultry meat and eggs, culled birds, day old chicks and hatching eggs. Poultry wasted includes manure, litter, damaged eggs, rejected eggs, waste feed, poultry intestine and duck feed and feather. All these can be used for further raw materials in different types of industry like small scale power manufacturing business through bio-gas, pillow making industry by using feather, fertilizer manufacturing industry from manure and wastes, fish feed from intestine and rejected eggs, charcoal from poultry litter and so. This process can easily determine how many birds will be remaining in the farm after having mortality, disease etc. Table 1 shows the different by-products which come from poultry wastes through further process. All these by-products are very important and basic needs for Bangladeshi agriculture sector. Thus, it can further contribute to other industry as well. Again, Table 2 shows the economic and social aspect of Bangladeshi poultry farms. In fact, lots of people are engaging with this industry at different levels. The researcher only concentrated the three types of farming within the poultry industry such as grand farms, breeder farms and broiler/layer farms. In this whole process, society is getting huge benefits including generating new businesses and entrepreneurs, reduce unemployment, minimize dependence rate, empowering women etc.

In the output phase, meat and eggs are not the only products that customers can get from the poultry industry. There are some other output like bi-products (manure, bio-gas, feather, fish feed, charcoal), day old chicks, culled birds which can be sold in the market for customer consumption, eggs (fresh and rejected), meat (ready market and further processing) are generating as a poultry industry output. Besides that lots of associate industries are relating with poultry industry such as feed, medicine, pathological resources, logistics, cages, expertise, breed supplier, importers, distributors and other associated farmers. It is always difficult to maintain all the stakeholders without implementing effective supply chain into this industry. For this reason, the researcher tried

to dig out the further improvements of this industry in the light of sustainable supply chain which is very much related with triple bottom line theory.

Table 1: Possible Bi-Product from Poultry Wastes

Wastes	Generate	Industry
Poultry Wastes	Fertilizers	Crop
	Bio-gas	Power
	Charcoal	Power
Poultry Feed Wastes	Fish Feed	Fish
Poultry Feathers	Bed and Pillow	Pillow
Damaged Eggs	Cake and Biscuits	Bakery

Source: Interview

In the same figure, the researcher indicates the different output which can easily classified into three different ways. In the economic view point, fresh meat, fresh eggs and processed meat are the main economic products for the poultry owner. Besides that, there are huge prospects to make bi-products from poultry wastes those also very good economic viable bi-products. In social view point, Bangladeshi poultry industry is really rich which engages more than 15 million people (according to government official) directly or indirectly. This business is extending out in the remote areas which help to reduce poverty, diminish unemployment, and empower women. Finally, proper poultry waste management meeting up environmental side of sustainability that keeps environment unchanged or intact and recycle or reuse the wastes economically. Besides that the economic aspects is very bright in this process as every circle denotes one single business with required investments and employments due to commercialization of poultry industry. In every single stage of poultry supply chain process model indicates social, environmental and economic well-being which is very much essential to achieve sustainability within a business operation.

Table 2: Possible social and economic outcome

For 1000 birds	Cycle Tenure in Days	Employment (Per Cycle)
Grand Parent Farms	250-350	10-15
Breeder Farms	300-420	15-20
Broiler Farms	30-40	1-3

from Bangladeshi poultry; Source: Interview

In the figure two, upper portion of process can maintain strong social aspect of sustainability. This social section can generate huge employment through poultry rearing, can give social recognition as an entrepreneurs or businessman, meet up social requirement of protein and food values, and can reduce poverty level which is very effective for country like Bangladesh. Besides that, this kind of expansion can bring lots of merits in the society like create young and women entrepreneurs, alternative income generating business, engagement of idle family members in productive way, reduce unemployment rate, part time working facilities and so on. These kinds of activities can change whole society as a productive nature.

In the bottom-left side of figure two shows the environmental issues of poultry industry in Bangladesh. By taking in-depth interview from experienced poultry owner, the researcher came to know that there are insignificant use of poultry wastes make the environment polluted and destroying living environment as well. The sample respondents are doing some environmental practices which help them to free from poultry disease, blockade of lands and making some money by creating bi-products (bio-gas, fertilizers and fish feed) from wastes.

Furthermore, bottom-right side of figure two indicates the economic issues of poultry industry in Bangladesh. In fact, the whole model is meeting up economic aspects in the context of generating value added products, different types of small scale industry and making extra profit. In this particular economic section which is circled by square dots can generate huge economic boost by increasing production. Bangladesh is a small country with 153.5 million peoples who need to get

optimum amount of protein supply from poultry industry. This is the scope lying on this industry which can give the huge benefits to its all stakeholders including ultimate customers, governments, entrepreneurs, suppliers, banks etc.

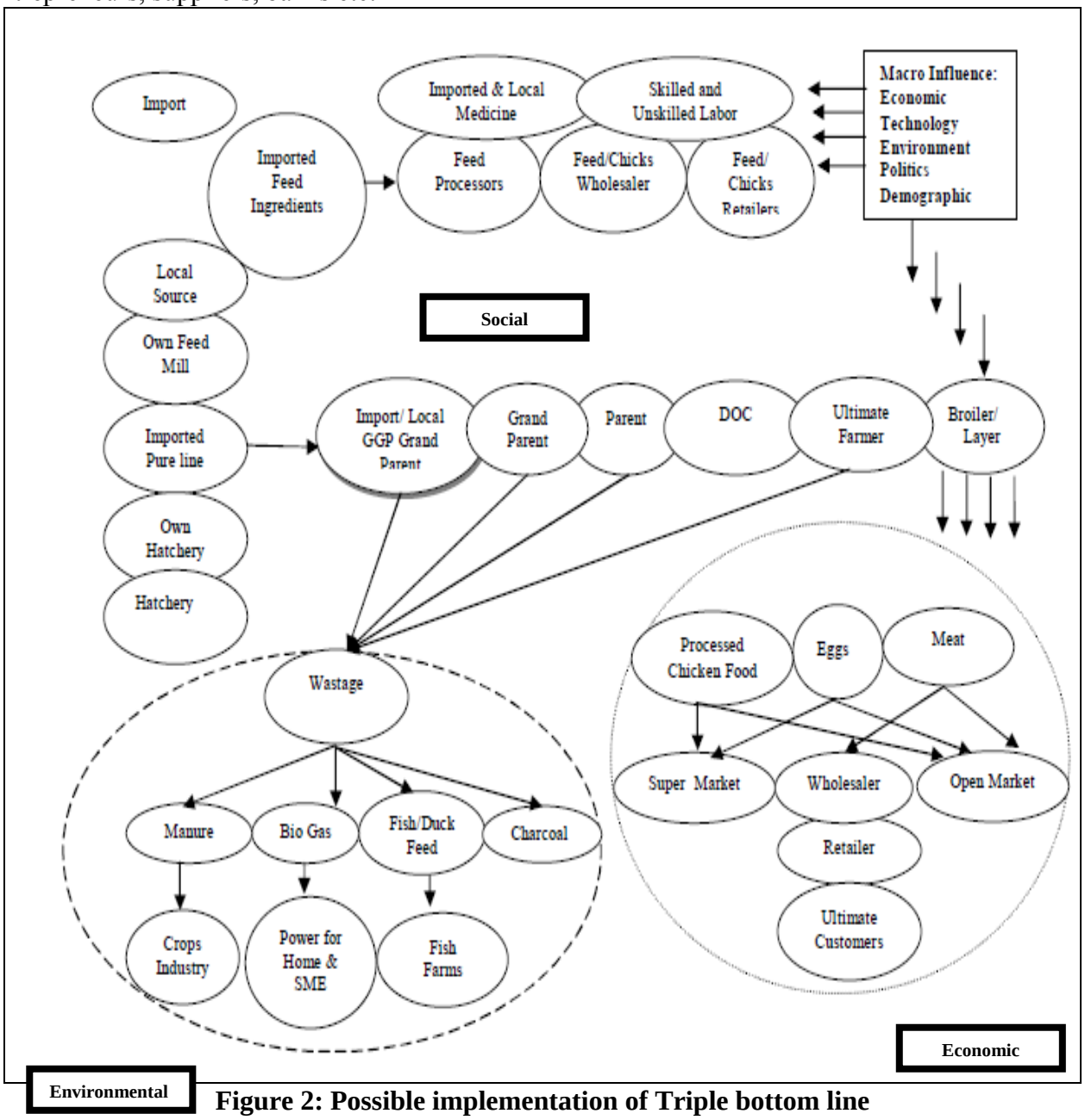

Figure 2: Possible implementation of Triple bottom line of Sustainability in the poultry sector of Bangladesh.

Apart from triple bottom line issues, supply chain is very much related issue with this proposed sustainable supply chain poultry model. Only effective supply chain can implement the whole system as workable and profitable. In this case, forward supply chain (FSC) and reverse supply chain (RSC) issues will be the key to expand the whole business in a sustainable manner. Thus, Bangladesh can achieve great success if they can combine sustainability and supply chain attribute in their poultry industry.

FURTHER DIRECTION AND CONCLUSIONS

This paper develops a proposed process model in light of sustainability and supply chain issues. The study did not investigate or explore the model empirically which might have a different outcome. The proposed model was developed based on in-depth interview of existing leading poultry entrepreneurs. Future research could test the entire proposed process model to find out the

outcoming or impacts of total industry including effective operation. The model has already depicted three facets of social, economic and environment blocks of triple bottom line. Further research can be done partly basis as well. Researchers have intention to have further study on such unexplored issues. Such kind of research will definitely help Bangladeshi poultry stakeholders to operate their current businesses that will be more sustainable having effective supply chain management.

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