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Reverse Supply Chain in Thepoultry Industry

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As concern for the environment grows, the concept of reverse supply chain has gained increasing attention in business and academic circles. Attention to supply chain management has progressively amplified since the 1980s when firms realized mutual profitable relationships within and beyond their own organizations. In time, reverse supply chain issues also came to fore with the focus on the environment, product return -, waste reduction, recycle and re-use. In this research project, the existing poultry industry in Bangladesh is used as a case study to explore a new model for reverse supply chain management. The objectives of this paper are twofold;first, it offers a reviewon existing reverse supply chain literature; second, it offers a conceptual reverse supply chain process model in the light of poultry industries in Bangladesh. The model has been developed through -in-depth interviews with leading poultry entrepreneurs. The paper also focuses on three R's (Recycle, Reuse, and Reduce) of reverse supply chain along with supply chain management in the root of poultry industry.

Keywords: Environment, Reverse Supply Chains, Poultry Industry, Bangladesh

Introduction

Supply chains and the environment are intricately related matters in the corporate arena. Supply chains are a critical next step from recent examinations of operations and the environment (Corbett and Kleindorfer, 2003). If our environment is to remain intact for the next generation, it is vital for most companies to adopt green practices. Green practices such as implementation of reverse supply chains help both the company and society. Reverse supply chains (RSC's) refer to the series of activities necessary to retrieve a spent or used product from a customer and either dispose of it or recover value from it(Prahinski and Kocabasoglu, 2006). RSC scan potentially reduce the negative environmental impacts of extracting virgin raw materials and disposing of waste (Canan et. al, 2007). In addition, companies may use RSCs to maintain optimal production while reflecting perceived customer demands. The current perception is that major companies are under tremendous pressure from their customers regarding environmental practices. Customers want to see that companies with whom they do business with are concerned with and invest money from their profits to preserve the environment. The natural environment, society, and economic performance are related to environmental sustainability (Elkington, 2004). Customer perception suggests that it is crucial for industry to combine sustainability and supply chain concepts along with concern for the environment with their production process. Bangladesh is small geographically compared to its population; consequently, environmental issues are prominent along with other major problems like food scarcity, education, governance, and women's empowerment and so forth. In Bangladesh, poultry farmst ypically develop under private ownership in an unstructured way. A significant percentage of farmers do not have adequate scientificor systematic knowledge on the operation of modern poultry farming, various value added poultry products, dynamic forward and reverse supply chain issues or waste management. Apart from this, there are certain common risks of market vulnerability and disease management that remain the main obstacles for this industry. The majority of poultry industry owners have little idea about reverse supply chains or issues concerning the environment. Environmental issues are increasingly important in Bangladesh because of huge population pressures, limited land resources, food crises and drastic climate changes. A significant research gap in this area exists as only a few related works have been produced. This gap has motivated an approach of empirical testing of a

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model that considers both reverse supply chains and environmental issues of the existing poultry industry in Bangladesh.

Research Objectives

The specific objectives of the proposed research are as follows:

1. Examine available theory on reverse supply chains;
2. Develop a model for the poultry industry that usesreverse supply chains.

Research Case Justification

This study contributes to both theoretical and practical aspects of the poultry industry in Bangladesh by using existing knowledge of the field of poultry processing and its supply chain and enhancing this knowledge by implementing forward and reverse supply chains. Foreign donors and social groups are pressuring both the Bangladesh Government and its industry owners to give attention of the environment by taking care of wastage. Countries like Bangladesh struggle to operate with their agricultural businesses, and the RSC concept along with an increasingly strong consciousness growing up to implement environmental concepts in the industry suggest that it is essential to implement 3R concepts at the industry level because Bangladesh has scarce land resources, raw materials and capital. However, there are huge gaps in implementing reverse supply chain theory to this particular industry and its operations. This research proposes a poultry model which includes the concept of reverse supply chains. The use of reverse supply chains will potentially remove environmental hazards by utilizing existing poultry wastages that generate various bi-products for use by different industries and for home use in a socially, economically and environmentally viable manner for the Bangladesh context. The model will show how poultry wastages can be used to generate various bi-products for different industries; potentially opening a new window to creates maller to medium enterprises which can accommodate more employment. Consequently, this process will deal with social, economic and environmental issues in an integrated way by using the concept of reverse supply chains. Thus, the proposed research will produce additional knowledge and contribute significantly to practical aspects of reverse supply chains as they relate to poultry management.

Literature Review

The concept of '3R' is a renowned and well-accepted concept referring to reduce, reuse and recycle, particularly in the context of production and consumption. This concept deals with recycling materials, reusing materials after they have been produced as well as manufacturing wastes and reducing the resources and energy used in the production cycle. These ideas are applied to the entire lifecycle of products and services from design and extraction of raw materials, to transport, manufacture, use, dismantle and reuse, and disposal (Srinivas, 2007). Managers face tremendous pressure to form sustainable supply chains that address increasing environmental concerns (Klassen and Vachon, 2003). Environmental issues are increasingly considered apriority alongside other business matters because of scarcity of resources and rapid climate change. Supply chain analysis has already expanded its scope to meet present business needs and a huge variety of products and complex customer needs.Among these, one of the most dynamic concepts to be introduced is the reverse supply chain (RSC) concept, which is very much related to the concept of recycle, reuse and reduce as it may be applied to product wastage. Literature studies shows that a number of works have been done in the field of reverse logistics and supply chains. However, literature pertaining to RSCs is relatively unusual as it is a comparatively new concept among all of the other supply chain concepts. Here, RSC refers to the series of activities necessary to retrieve a used product (or a product waste) from a customer and either dispose of it or recover value from it(Prahinski and Kocabasoglu, 2006; Guide and Van, 2002). Use of RSCs potentially can reduce negative environmental impacts of extracting virgin raw materials and waste disposal(Kocabasoglu, Prahinski and Klassen, 2007b). Investment in the RSC process should not be made in isolation, but instead must be integrated with investments selected to improve the forward supply chain (Kocabasoglu, Prahinski and Klassen, 2007a).By using the Bangladesh poultry industry asa research case this researcher aims to find out how reverse supply chains can be applied in the poultry industry.

Research Design

This paper uses observation tools to generate a reverse supply chain process model for the Bangladesh poultry model in light of economic,

social and environmental benefits and impacts. Both primary and secondary information has been used in this study. Primary information was collected between February 2009 and March 2009, mainly through in-depth interviews with sample respondents. The respondents included three poultry entrepreneurs who have had long business experience in this industry. These three entrepreneurs are the owners of Nahar Agro Complex Limited, Mirarsharai Poultry Farms Limited and Paharika Hatcheries Limited. Secondary datawere collected from referred journal articles, statistical yearbooks and NGO reports.

Bangladesh And Its Poultry Industry

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 (Shamsuddoha and Sohel, 2008a). Again, poultry plays a key role in the country's economy through its direct or indirect involvement of about 73% of people living in rural areas. Bangladesh has a long history of poultry rearing under traditional backyard farmingpractices(Reneta, 2005).Poultry is dominated by backyard local chickens ("Desi or local"), which mostly survive through a natural scavenger system (Nielsen, 2007). Poultry is one of the substitute in connection with the development of Bangladesh (Shamsuddoha and Sohel, 2008b). The poultry industry, as a fundamental part of animal production, is committed to supply the nation with a cheap source of good quality nutritious animal protein in terms of meat and eggs (Shamsuddoha, 2010).

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 (Das et al., 2008). The majority of rural households in Bangladesh (89%) rear an average of seven birds per household. Therefore, poultry is such an activity that can contribute massively to the GDPif this industry can be able to utilize skilled human resources. In the early nineties, a number of private stock farms and breeder farms shifted their operations to produce commercial day-old broiler and layer chicks(Reneta 2002, 2005). However, a lack of adequate and appropriate infrastructure is the main problemin this livestock sub-sector.

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 (social, economic and environment) but not in organized way (Shamsuddoha, 2010).This industry somehow keeps significant contribution to the society in terms of economic, employment generation, and protein supply. Now a day, poultry industry owners incorporating foreign technology and breed in their commercial farms which already proved much more profitable than past. These new technologies and breeds are coming from France, Canada, USA, China, Malaysia, Thailand and India. These modern concepts including 3R, Triple bottom line and reverse supply chains are priority among all of them.

In this circumstance, poultry rearing along with reverse supply chain can play a significant role in keeping the environment intact, generating income through making by-products from poultry wastage, eradicating poverty, empowering rural women, enhancing nutritional needs, providing food security and improving this country's economic and development procedures.

Reverse Supply Chain (RSC), Environment And Bangladesh Poultry Industry

Supply chain management expanded from its conventionalfocal pointof forward flow of materials, components and products to clearly address the disposal, recycling, reconditioning and remanufacturing of used products(Kocabasoglu, Prahinski and Klassen, 2007).The supply chain planning in reverse logistics of end-of-life (EOL) products embraces many different characteristics of environmentally conscious manufacturing, including disassembly, reuse, recycling, and remanufacturing(Gungor and Gupta, 1999). In contrast, the reverse supply chain (RSC) refers to the series of activities necessary to retrieve a product from a customer and either dispose of it or recover value(Guide and Van, 2002; Prahinski and Kocabasoglu, 2006).Most reverse supply chains are organized to carry out five key processes of product acquisition, reverse logistics, inspection and disposition, remanufacturing or refurbishment and marketing(Blackburn et al., 2004). Again, the reverse supply chain (RSC) refers to the series of activities necessary to retrieve a product from a customer and either dispose of it or recover value(Prahinski and Kocabasoglu, 2006).

The importance of reverse supply chain have been appreciated and implemented by the world's largest super store,the American companyWal-Mart and its processing centre are responsible for RSC logistical aspects of repairs, replacement part return to customers, inspection, salvage, disposal and reworking such as upgrades(Krumwiedea and Sheub, 2002). Internationally, there are numerous large companies applying reverse supply chain concepts for the sake of the environment, customer satisfaction, customer demand and so forth. These kinds of practices are not always non-profit oriented. In other words, there can be a profit motive to employing reverse supply chain solutions.

In the poultry industry, there is no option of product retrieval, return or reconditioning in the usual sense, as most chicken products are perishable. However, there are immense opportunities to reuse or recycle poultry wastage. By reusing poultry wastage, industries can make valuable products like fertilizers, bio-gas, pillows, charcoal, and bakery items. This kind of wastage conversion will help to maintain our environment and will add value at the customer end of the product cycle.

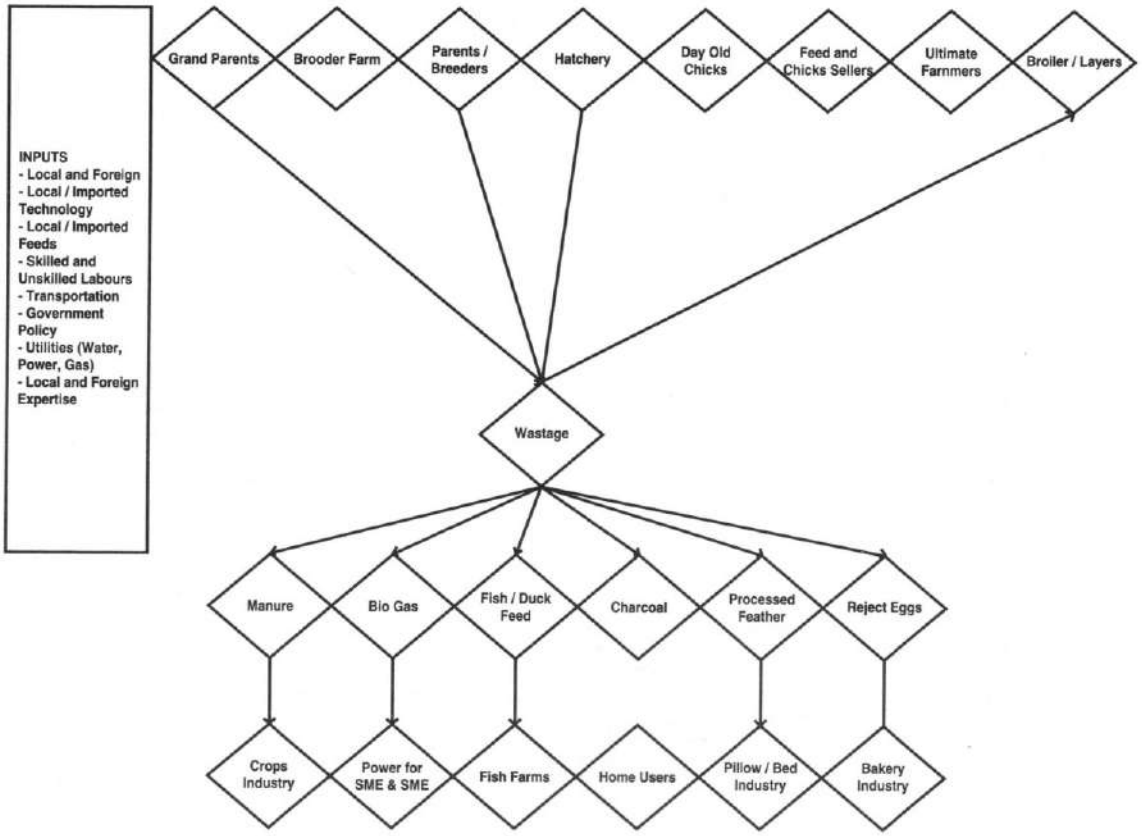
This research examines the reverse supply chain issues within the existing poultry process based on recycle, reuse and reprocessing. RSCs in the poultry industry have not received attention in the past by poultry entrepreneurs. There different wastes of poultry include manure, litter, discarded feed, feathers, broken eggs and intestines. Poultry manure may be used for fuel, fertilizer, bio gas, charcoal and fish feed; feathers can be used as raw materials for the bed industry; broken eggs may be used for the bakery industry; and intestinesmay be used for the fish farming. These areas have high potential and meet up with social, economic and environmental aspects of the poultry industry, which will make this industry more sustainable.

Application of Reverse Supply Chain in Bangladesh Poultry Industry

Most companies operate their businesses for the sake of profitability. This is why companies often examine and assess market feasibilityrelated to existing product demand, future trends, diversified prospects, changing customer behaviour, and economic and societal impacts. These issues are all influenced by theproduction process, existing final products, environmental hazards, changes in costs, customer buying power and changes ingovernment rules and regulations. The poultry industry in Bangladesh is not an exception to these concerns when it comes to the consideration of profitability.

Figure 1 illustrates that the poultry industry has a long supply chain that can easily create appropriate

Figure 1: Poultry Waste Management



social and economic value ina country like Bangladesh. Every individual poultry process generates lots of poultry waste such as culled birds; rejected hatching eggs; litter; manure; rejected, damaged, broken and un-hatched eggs; waste feed, poultry intestines and feathers. All of these can be used as further raw materials for different types of industries. The figure also demonstrates that Bangladesh poultry starts from Grand Grand Parent (GGP) farms and it ends with ultimate broiler and layers breed. It is noted that GGP creates Grand Parent (GP), GP creates Parents or poultry Breeder and finally poultry breeder creates ultimate broiler or layer chicks. These chicks grown up in a certain period and produce eggs and meats for ultimate consumptions.

New industries may emerge from the use of RSC concepts as they apply to poultry waste management; these include industrieslike a small-scale power generating industryusing bio-gas created by the poultry;a pillow making industry using feathers, a fertilizer manufacturing industry from manure and other poultry waste, a fish feed industry from intestines and rejected eggs, a bakery industry to make cakes and biscuits from certain kinds of rejected eggs,a charcoal industry from poultry litter and so. There are two kinds of rejected eggs, broken and unbroken eggs, broken rejected eggs may go directly to the fish feed industry and unbroken rejected eggs may go to the bakery industry.

Table 1 shows the different by-products that may come from poultry wastes through reversing poultry wastage. The social and economic contributions are very important and basic needs for the Bangladesh agriculture sector. Thus, the use of RSCs can further contribute to other types of industry by providing raw materials.

By conducting in-depth interviews with large poultry farm owners, the researcher came to know that there is a lack of use of poultry wastes. This lack of use in turn pollutes the environment. The participants in the interviews aretrying some environmental practices suggested by RSC, which may help them to remain free from poultry disease and make some extra economic benefits by creating bi-products from wastes. From an economic view point, fresh meat, fresh eggs and processed meat are the main economic products from the poultry industry.Besides that, there are huge prospects to generate bi-products from poultry wastes. These generated bi-products may also have good economic value for both society and industry. These new bi-productsand the related businessesmay help to reduce poverty, lessen unemployment, and empower women.

Finally, proper poultry waste management can help to alleviate environmental hazards. The economic and social aspects of RSC with respect to the poultry industry are incredibly vivid in that the reverse supply chain process applied to each individual waste could help to build a new business. These businesses can easily commercialize their products for both home and industrial users in Bangladesh.

In conclusion, the concept of the reverse supply chain is very much related to other supply chain concepts and can be applied in an organized way to the Bangladesh poultry industry. This kind of practice will keep the environment safe and clean for the next generation. Furthermore, the enhanced clean environment resulting from the

Table 1: Possible Bi-Product from Poultry Wastes; Source: Interview

Waste Types	Name of Waste	Possible By-Products	Usage
Poultry wastes	Poultry litter	Fertilizers	Crop industry
	Poultry litter	Bio-gas	Industry/home user
	Poultry litter	Charcoal	Industry/home user
Feed wastes	Discardedpoultry intestines and feed	Fish feed	Fish industry
Eggs	Rejected eggs (unbroken)	Biscuits and cakes	Bakery industry
	Rejected eggs (broken)	Fish feed	Fish industry
Poultry feathers	Processed feathers	Beds and pillows	Bed and pillowindustry
Deadchicks and chickens	Chicken paste	Fish and duck feed	Fish and poultry industry

implementation of the RSC concept will assist farmers with the prevention of common poultry diseasesin their poultry complexes. Only an effective supply chain model along with reverse and forward supply chain can implement the whole system as practicable and cost-effective. Thus, Bangladesh can achieve great success if they can combine and applyreverse supply chain issues in their poultry industry.

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