CROSS-DOCK MODEL TO REPLACE TRADITIONAL SUPPLY CHAIN OF VEGETABLE INDUSTRY THROUGH ELIMINATING BOTTLENECKS: BANGLADESH PERSPECTIVE

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ABSTRACT

As an agro-based country, Bangladesh has the competitive advantage on vegetable industry since long and due to this fact, many researches has been done on this industry focusing on competitiveness, production & process, trade facilitation, value addition ET el. Being one of the largest producers of vegetable, some bottlenecks on the supply chain are dragging Bangladesh out of the race from global competition. Now, the paper is focused on finding and thus, emancipating the supply chain bottlenecks of this industry. Here, the paper shows, an unnatural price gap between the upstream and downstream parties on the chain. Explains the reasons behind this –which is the present SC model. Also finds the cure to fix the problem by proposing a cross-dock based agent led model to minimize the exploitation of intermediaries toward growers and end consumers. Finally, shows a case study to validate the authenticity of the proposed model.

Key words: Supply Chain Management, Vegetable Industry, Cross-Dock Model, Bottleneck, Intermediation & Disintermediation.

1. Introduction

Bangladesh being a tropical agrarian country produces numerous vegetables comprising both local and exotic types. The farmers of the country produce about 100 varieties of vegetables all the year round and export, through market makers, 54 different kinds of vegetables (Dao 2004). Vegetables and crops share about 11.7% of agricultural GDP of the country. According to, Bangladesh Agricultural Research Institute (BARI) Bangladesh has ranked third in vegetable production which proves the enormous potential of becoming a major exporter of vegetables in addition to meeting huge domestic demand given the current bottlenecks are dealt with proper emphasis and coherent policies.

In terms of DRC (Domestic Resource Cost) measure, vegetable industry is one with impressive score of comparative advantage for Bangladesh (Karim, Hossain et al. 2011). Although, too many intermediaries are predominantly creating bottlenecks. Which deprive farmers-consumers and eventually possess threat for industry expansion and growth. So, it is of high importance for Bangladesh to eliminate the key bottlenecks of supply chain to make it a more potent player in world vegetable export industry in addition to meeting its domestic needs more efficiently. Vegetable is also one of the HVCs (High Value Crops) for Bangladesh (Nabi 2011).

2. Objective of the Study

The major objective of this paper is to identify the source of obnoxious price difference between field level (farmers) and consumers. There are some other objectives of this paper along with the major one which are –

- To figure out actual problems prevails in the current SC model.
- To propose an alternative solution or re-modelling the prevailing supply chain structure to make a win-win for Farmer and legitimate customers.

3. Methodology of the Study

A. Sources of Data

We have used both the primary and secondary sources of data for conducting this study.

B. Data Analysis

This is a qualitative research where a new model has been introduced in order to reducing the abnormality which exists in the existing supply chain model of agricultural goods.

C. Research Questions

a. What are the constraints & bottle necks of the industry?
b. How does the constraints links to bottlenecks and results intermediaries on the chain?
c. How can we solve the problems related to the existing SC model?
d. How to improve the current scenario using the proposed model?
e. How to validate the proposed SC model?

2. Related Research

"Crossdocking is the transfer of goods and materials from an inbound carrier to an outbound carrier, without goods or products actually entering the warehouse or being put away into storage". There are several versions of crossdocking and all of them can help on savings inventory significantly. Among several types of crossdocking the Hybrid crossdocking goes well with the nature of vegetable industry (in Bangladesh). Because, materials at the warehouse are blended in with incoming materials, and these newly completed palletized orders are then routed to outbound trucks. Likewise, some of the incoming goods may be routed to temporary storage in the warehouse instead of all being cross docked (Kulwiec 2004).

SC models create a structured organizing and standardizing processes to manage and facilitates communication among the supply chain participants. And SC remodeling is something that modifies existing functionality and that's what we tried to do here using a crossdocked SC model for the vegetables industry (Ellinger, Shin et al. 2012). The traditional SC model (of veg industry in Bangladesh) shows many unwanted intermediaries like Foria (commission agent or jobber), Bepari (trafficker or local dealer), aratdar (keeper of warehouse), dealer, syndicator, wholesaler, retailer, super chain shops etc. who make the supply chain lengthy and put the growers and end consumers in misery (Sabur 1992). To solve this problem, the paper uses the crossdocking concept and designs and proposes an alternative crossdocked SC model for the industry.

Although, we are getting a large numbers of supply chain focused studies on manufacturing industry, those we try to fit into the agricultural sector, but in reality using SC on agricultural sector is not easy (Vidal and Goetschalckx 1997, Min and Zhou 2002, Meixell and Gargeya 2005). However, agro-food takes long lead time and the uncertainties of supply and demand (Lowe and Preckel 2004). In the vegetable supply chain, uncertainties of supply, process and demand of the product has a significant impact on the whole supply chain process (Wilding 1998).

A series of studies and reports has been conducted on the agro-industry of Bangladesh. A very recent study of Hasan (2013) shows the Barriers to International Entrepreneurship in the Agricultural Sector of Bangladesh, Focusing on Vegetable Production. Also many supply chain bottlenecks such as unreliable transportation system, insufficient cargo facilities etc. become evident from the paper. Blackburn and Scudder (2009) presented what kind of supply chain strategy should be adopted for the perishable products. They also suggested that supply chain strategies & framework be based on a simple choice between efficiency and responsiveness spectrum. On the Bangladesh Journal of Agricultural Research; the Comparative Advantage of Vegetable Production in Bangladesh is shown with an empirical study (Karim, Hossain et al. 2011). As per the study of Nabi (2011) goes; vegetable is one of the HVCs (high value crops) of Bangladesh which has positive effect on the economy is shown with a comprehensive study on HVC and live stocks value chain. Through an online report of Katalyst (2011) shows the supply-demand gap, major constraints & bottlenecks of the vegetable industry of Bangladesh. According to a newspaper report done by Palma (2012) indicates how Growers are not getting just prices for vegetables, middlemen are gobbling up their profits, the absence of market management and government policy support. Another study from Hoq, Raha et al. (2012) measures Logistics cost, wastage cost of suppliers' in Bangladesh through Value Addition in Vegetables Production, Processing and Export from Bangladesh.

All of these abovementioned studies are either directly or indirectly indicates the supply chain framework of veg industry, vegetable industry growth & competitiveness and market condition, constraints & bottlenecks etc. They also point out how the farmers are ill paid; how intermediaries are in the driving seat while setting up the market price for vegetables; missing links between market and suppliers etc.

However, unlike the manufacturers the growers in the vegetable industry cannot control the information & price gap. And that's where our idea of agent led – crossdocked supply chain came up. Where, the agents will do whole lot of activities on behalf of the farmers or growers whilst disintermediating unwanted parties.

3. Scenario Analysis and Bottlenecks in Existing Vegetable Industry Supply Chain of Bangladesh

A. Scenarios those Hinder Farmers and Top Upstream Party to Get Good Price

Bangladesh's vegetable industry is facing a very unusual phenomenon as per the basic supply-demand theory goes. In Bangladesh, the overall internal demand of vegetable industry is way above the supply (Katalyst 2011). Hence, the farmers or producers of vegetables should have had a big bargaining power to set a big price for fresh vegetables, but they are the number one weakling in the whole supply chain (in terms of getting a good price). Bangladesh's estimated internal demand is around 3.5 million Metric Ton (MT) whereas, the amount of vegetable production is less than 1.5 million MT (Katalyst 2011). Which depicts there is a big shortage of supply of more than 2 million MT vegetable in the market. So, logically farmers should have enjoyed this big "benefit of deficit" from the market by seeking unusually high price. Instead, they are getting unusually lower price. And in some worst case scenarios, many growers are destroying the veggies on the field.

According to Palma (2012) main reasons for farmers to face heavy loss due to low price in winter vegetables are; absence of market management and government policy support. This low price issues had been featured to many local newspapers too. The reports also featured that this dreadful pricing puts small and marginal growers into deep crisis and frustration.

B. Constraints & Bottlenecks Conundrum in Vegetable Industry.

As per a recent study "Barriers to International Entrepreneurship in the Agricultural Sector of Bangladesh" which was focused on vegetable production, has found some rather interesting findings on fresh vegetable industry. The study along with some other recent studies has revealed three major constraints which leads to two bottlenecks; resulting many intermediaries inside the supply chain. Let's discuss it in details on below:

The three major constraints those hinders the burgeoning of vegetable production in both local and international markets are:

1. Limited access to skills and information.

2. Lack of access and uses of quality inputs.

3. Restricted market access for farmers (Katalyst 2011).

And these three constraints cause two major bottlenecks of vegetable production & distribution, hence the total supply chain. The two bottlenecks are -

1. Low productivity.

2. Missing link between market and production (Katalyst 2011).

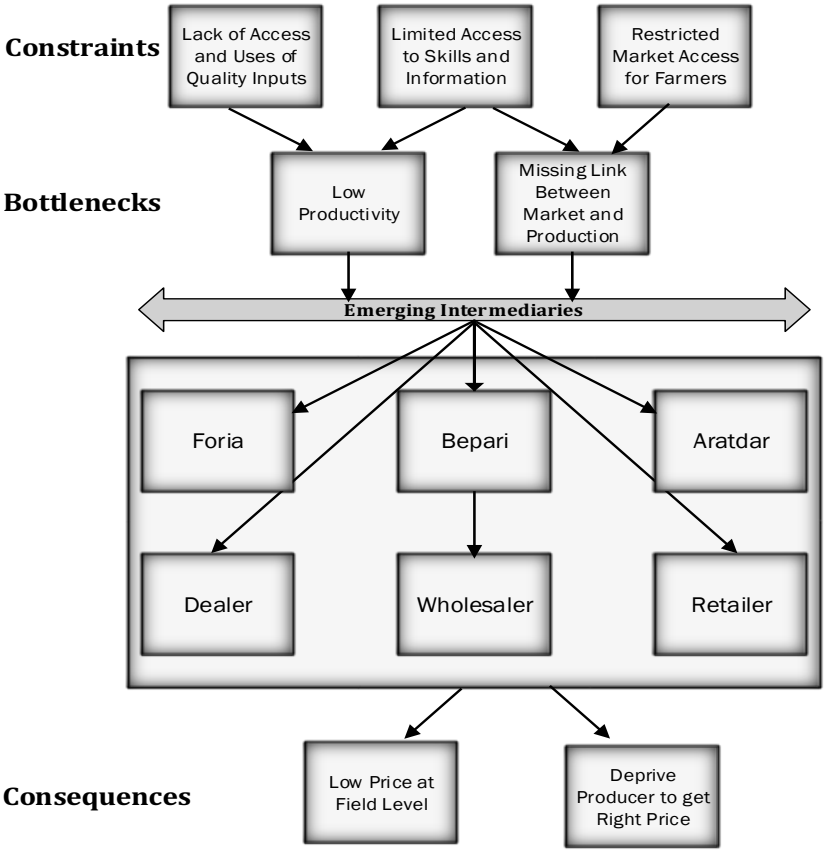

Figure 1: Constraints-Bottlenecks Framework in Existing Vegetable Supply Chain

These 03 constraints and 02 bottlenecks together create some parasites in the supply chain of vegetable industry. Which are obviously the Intermediaries; who uses & understands these profound connections between constraints & bottlenecks and often deprive vegetable producers from getting right price due to absence of direct link between vegetable producing farmers and markets. Also restricted market access for farmers patched up with the missing links between market and production – causes farmers to get very low price at field level.

C. Explanation of Traditional Supply Chain Model of Vegetable Industry and intermediaries as parasites inside

As it is stated above, efficiency is being lost due to too much Intermediaries because of middleman factor; which is responsible for the gross mismatch of price between farmer and consumer. At least 4-5 hands vegetables move (Glover and Ghee 1992). This too much movements are also quite obviously spikes the vegetables price up by hitting the biggest driver of SC-logistics. And

the traditional SC (shown in below) scenario of the industry also supports this, which starts from 60's and still prevails only on the basis of trust and oral contracts.

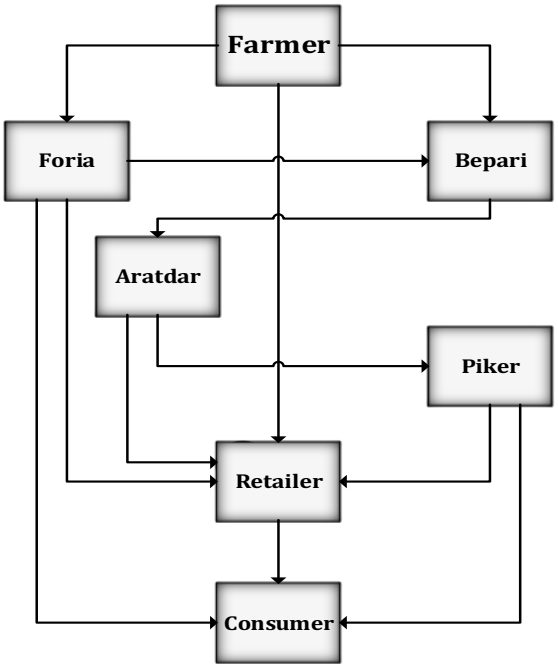

Figure 2: Traditional Supply Chain Model of Vegetable Industry of Bangladesh (Sabur 1992).

Here, farmers are sole producers of the vegetables. Whereas, the Foria (commission agent or jobber), Bepari (trafficker or local dealer) and quite recently the retail super chain shops are purchasing from farmers directly. These Forias and Beparies are actually middle-men who are acting as agents to sell the vegetables to Aratdar (keeper of warehouse) and other whole sale and retail sellers. Basically, these Foria & Beparies are doing business out of nothing but using before mentioned constraints & resulting bottlenecks. They are not investing much, just purchasing from the farmers at a lowest cost and selling to other parties instantly. But again after passing hands of Foria & Beparies, some of the Aratdars are stocking unnecessarily with a wicked plan to create a fake shortage of supply in the market. These Aratdars with the help of Foria & Beparies are causing this mishap. As a result, the price is increasing and also after moving from so many hands the vegetables price also increase due to concurrent addition of transportation cost. Transportation cost also incurs afterward, because, Faria, Bapari, Aratdars sale these veggies to whole sellers and whole seller to retailer and finally from retailer, end consumers get it. Each of these intermediaries keep their share of profit and adds other logistics cost to make the price unnecessarily high for the end consumer.

So, excessive presence of intermediaries and absence of direct link between farmers and markets makes vegetable producers deprived of getting "right price". Which simultaneously makes logistics cost much higher in the supply chain and eventually eats up the supply chain surplus. Logistics cost of supplier in Bangladesh in average is Tk.1500 per ton, which is 51.63% of the total cost. Where wastage cost for vegetable suppliers is Tk.376 per ton, which is again 12.93% of their total cost. And this data backs the abovementioned problem zone (Hoq, Raha et al. 2012).

D. Other Bottlenecks & Pitfalls of Existing Supply Chain

Most unfavorable condition for the SC is inadequate transport facilities. 92% respondents, in a recent survey, said-

a) Unreliable local transport system &

b) Insufficient cargo facilities are adding additional cost of operation resulting from lack of refrigerated & effective transportation system (Hasan 2013).

Products are mostly moved through truck loads. It incurs high cost & consumes lots of time due to unreliable transportation system. Moreover, there exists lack of adequate transportation arrangement through railways and water transportation. So all these factors are incurring higher transportation cost for our vegetable industry (Walkenhorst and Yasui 2004). Information asymmetry in entire vegetable supply chain can also contribute to the imbalance between supply and demand, and making SC more inefficient. Due to market making incapability and illiteracy, farmers usually can't address the demand and utility of end consumer. By capitalizing the unique properties (e.g. Perishable) of vegetable products and aforementioned lacking of farmer, intermediaries create supply-demand gap by disseminating asymmetric information and enjoy abnormal profit, which eventually make the existing VSC (Vegetable Supply Chain) more vulnerable. In order to increase the entire vegetable supply chain and ensure farmer-customer well-being, this paper designs an alternative cross-dock model to replace existing supply chain through eliminating bottleneck of vegetable industry in Bangladesh; which is presented it in the next section.

4. An Alternative Cross-Dock Supply Chain for Vegetable Industry: A Pragmatic Model to Eliminate Existing Bottlenecks

Due to the existing ramshackle supply chain, farmers are disheartened of not getting proper price and in other ways, Bangladesh as a country also loses competitiveness in world market. Considering aforementioned bottlenecks and farmer-customer wellbeing, this paper designs a cross-dock model to replace present supply chain, through eliminating bottlenecks of the vegetable industry of Bangladesh. Farmers' Agent led Cross-docking, with more effective functioning such as integrating transportation, logistics, storage and intermediary services; which might reduce cost for all members in entire vegetable supply chain. Below figure shows the recommended Cross-dock Supply Chain Model of vegetable industry of Bangladesh:

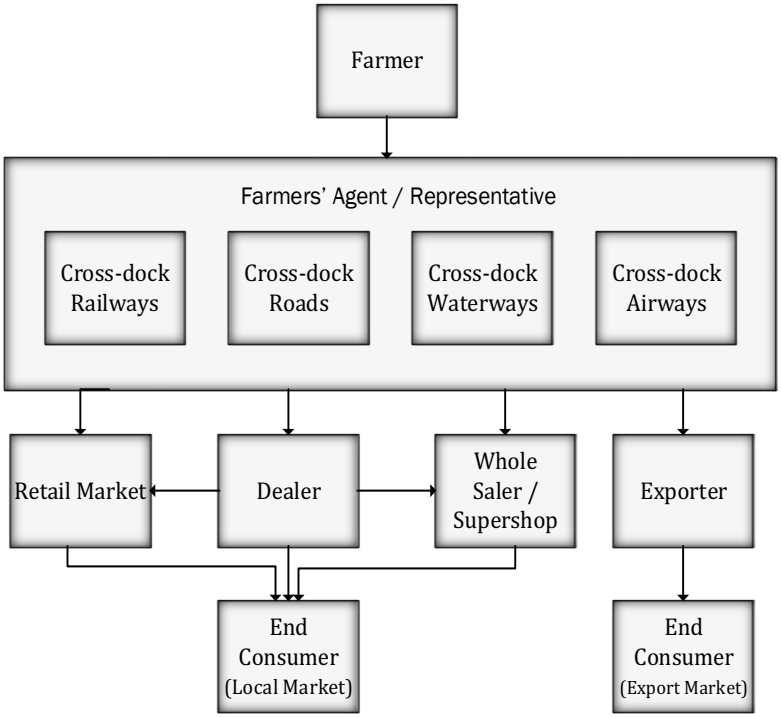

Figure 3: Recommended Supply Chain Model of Vegetable Industry of Bangladesh.

According to the proposed model, local farmer of a respective territory will form an association (like strategic partnership) and elect agent or representative team to market harvested vegetables through proper channels. Basically, Agent will operate cross-dock facility and emerge as a market maker on behalf of farmers to get best price.

On upstream part of the recommended model, farmers' harvested vegetables will be inbound at an agent led centralized cross-dock hub. At cross-dock hub, many value added services such as storage, packaging, Refrigeration, CLP and multi-modal Transportation planning will be performed which is described on later parts in details.

From cross-dock hub, products will move primarily to customers on mid-stream such as Retailers, Wholesalers, Dealers and Exporters as per sales order by using effective transportation modes (Railways, Roads, Waterways and Airways). In the end, products will move to downstream- end consumers, irrespective of local or export market. By this way, the new recommended model will disintermediate traditional model and increase entire supply chain surplus by channeling vegetables from growers to legitimate customer and consumer.

Now, Value added operations of Agent-led cross-dock hub are illustrated here:

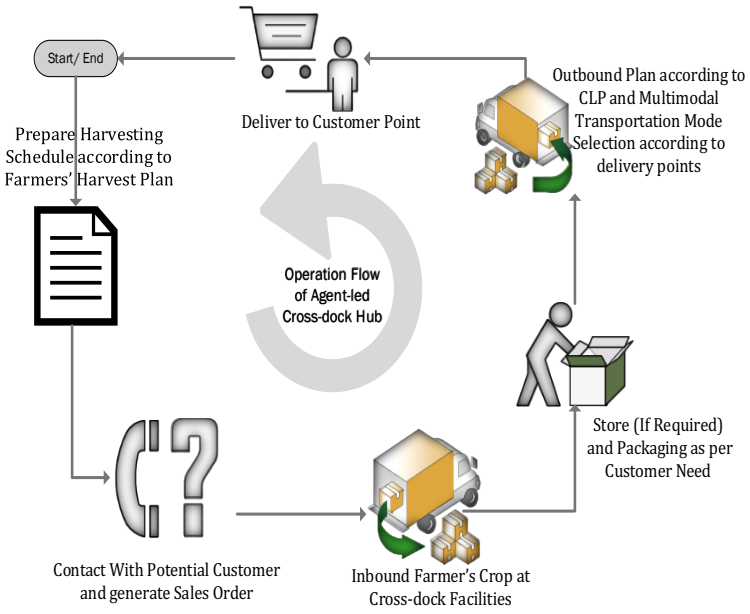

Figure 4: Operation Flow of Agent-Led Cross-Dock Hub

Initially, Agents will ask farmers for crops tentative harvesting time and after getting it, prepare "Harvesting Schedule" according to farmers' harvesting plan. Afterward, Agents will contact with potential customers as per harvesting schedule, form strategic agreement focusing on price and quantity sales with different secondary customers (I.e. Retailer, Wholesaler, Super shop and Dealer) by mentioning quality standard, packaging, delivery point, lead time and so on. In a Nut-shell, Agents will take responsibility to deliver ordered veggies at pre-defined customer points.

On the other hand, Agents will inbound farmers' Vegetables at Cross-dock hub as per harvesting schedule. Afterward, they will store and package as per pre-defined quality and packaging standard. Little storage, refrigerator and packaging facilities (as deemed necessary) will be available at Cross-dock points to meet customer requirements and maintain quality standards. Meanwhile, Agents will do outbound CLP (Cargo Loading Plan), multi-modal transportation planning and allocation according to delivery destinations to minimize per order transportation costs and meet lead time. Moreover, they will also select efficient transportation modes such as, Railways, Road, IWW (Inland Water Ways) or Cargo Air whichever seems best-fit to deliver ordered vegetables at pre-determined destination point.

Finally, outbound products will move out from cross-dock hub to customer points and delivery accordingly. By this way, centralized cross-dock hub, led by Agent; will be operational in recommended supply chain model of vegetable industry.

5. Improving The Current Scenario from New Model: Some Pragmatic Expectations

A. Ensure Strong and Resilient Supply Chain through Disintermediation

Now-a-days, the nature of competition in market (both local and export) is not between companies, rather between supply chains. In traditional model, intermediaries are the critical entities who link farmers and vegetable demanders. Due to the unstable intermediaries, the existing SC model tends to be uncertainty. In addition, as the production scale of farmers are small and scattered, the trade dealing between farmers and agricultural products demanders used to be many to many, which lower the negotiation efficiency. This new model can maximize efficiency using appropriate transportation mode and logistics resources, as well as saving time and cost. Most importantly, in the new designed model, Agent led Cross-dock facilitates will replace intermediaries to negotiate with vegetable demanders. This model will not only improve producer surplus and transportation cost but also ensure the information symmetry between farmers and vegetable demanders.

Productivity will increase because many middle and small sized growers; who are now scared to come or stopped production, will come again. They will have a pre-idea of prevailing price. So, they will be able to estimate their profit from the market based on their current production cost and setup. Apart from these, agent will do contract (strategic Alliance too) with secondary customers (e.i. Retailer, Dealer, Wholesaler and Exporter) which will eventually pave the way to establish a strong and resilient supply chain.

B. Logical Re-distribution of Supply Chain Surplus to Legitimate Parties

In the proposed scenario, Agent will directly market vegetable and interact with legitimate customers so that information asymmetry can be minimum in aspect of supply, demand and price. Retailer, Wholesaler/Super shop, Dealer and Exporter will purchase vegetable at best price from Farmers' Agent.

Both producer (Farmer) and consumer will enjoy higher surplus considering the existing supply chain. Bargaining power of farmer will increase and farmer will be in dominant position due to having bulk products and demand information. Whereas, Consumer surplus will also increase by getting veggies at less price and good quality (short lead time will ensure fresh consumable vegetable) because of disintermediation and proper transportation channel. In a nutshell, every parties in proposed supply chain will enjoy respective surplus according to their value addition.

C. Introducing Refrigerated Storage, Packaging and Cargo Facilities to Ensure Proper Quality

Almost every developed and developing country, that relies on agriculture; has introduced refrigerated storage and transports, which can reduce the waste of vegetable in a greater amount and kept fresh. Refrigerated storage, packaging and transportation facilities will be available at cross-dock Hub to ensure proper quality of vegetable, which farmer; oneself, can't effort.

D. Reducing both Supply Chain Waste and Transportation Cost

Middlemen, who are actually the exploiter, will be eliminated through the redesigned supply chain Model. The resulting disintermediation will simultaneously reduce the industry supply chain waste and transportation cost. Efficiency in supply chain like shortening the route through disintermediation and proper CLP can lower the cost of energy here.

E. Harnessing Optimum Use of Available Truckloads

Optimum use of truckload is another important factor to ensure transportation economies of scale. The more weight a vehicle can transport, the lower the cost will be; as the fixed cost components, the cost of delivery and administration can be spread over incremental weight. Unfortunately, still we haven't been able to optimize the use of vehicles (Roads, IWW and Air Cargo) especially due to small scale sales to intermediaries and as well, many different inbound and outbound delivery points. It is also come in point, when country's unplanned transportation infrastructure creates bottleneck for entire vegetable supply chain. The largest bridge of the country "Bangabandhu Bridge" does not permit to carry to full capacity by the vehicles which incur high cost in terms of carrying suboptimal quantity of merchandise (capacity of a 6-wheel truck is 23 tons where "Bangabandhu Bridge Authority allows to carry only 15 tons while passing the bridge).

By availing bulk products, CLP (Cargo Loading Plan) and different multi-modal transportation facilities at cross-dock hub, optimum use of truckloads will be ensured which will eventually reduce the total as well as per order transportation and delivery cost and in contrary, whole supply chain of the sector will become very efficient and responsive.

F. Using the IWW is more effectively to cut costs

As huge pressure is already on roads (covering 80% of national traffic) and insignificant infrastructure of railways prevails (only covers 7% of freight); what left behind, is our IWW (inland water ways) which is consisted of 700 rivers crisscrossed across the nation and the largest IWW network in the world. There is 5,150-8,046 km of navigable water ways (includes 2,575-3,058 km of main cargo routes). Our inland ports also handle about 40% of nation's foreign trades. Being cheap, safe and environment friendly, IWW can be used for vegetable transportation. It will reduce cost drastically; help to move large bulk amount of goods in a short period of time with no interruptions.

Bulk goods and facility set-up in nearby or bank of river are the pre-requisites to reap of full benefits of IWW which are plausibly possible for centralized cross-dock facilities in proposed model.

6. A Case Study

In this section, this paper uses a case to validate the proposed cross-dock supply chain for vegetable industry in Bangladesh. Here, we assume that, there are three farmers, one agent (who operates cross-dock hub), Local Intermediaries (Like Bepari, Foria or Aratdar), three secondary customers (such as Retailer or Super shop, Wholesaler and Exporter) and end consumer. The agent-led vegetables' distribution system is shown –

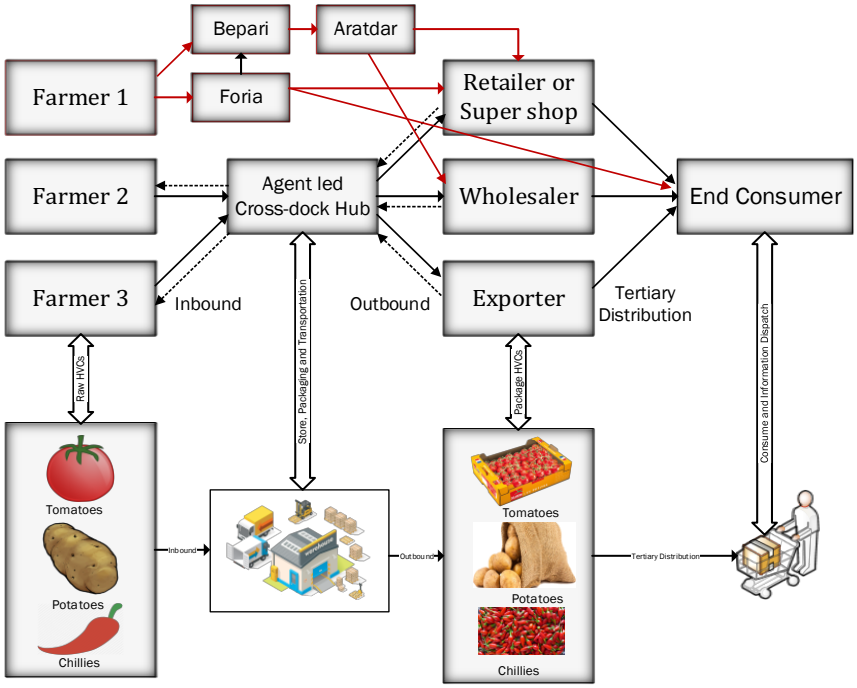

Figure 5: Agent-Led Cross-Dock Based Vegetable Distribution Network:

Here, following the traditional model, farmer 1 plants tomatoes, potatoes and chilies. Due to lack of market access, inadequate logistics and intermediary services, farmer 1 sells to different local intermediaries (Like Bepari, Foria or Aratdar). Usually, local intermediaries fetch vegetables from farmer's land or yard at reduced price and sell to other intermediaries or tertiary customers at premium price. The prices of these agricultural products are tomato 10 per kg, potato 8 per kg and chili 20 per kg.

Next, local intermediaries; using their market access, logistics and intermediary services, sell these products to other intermediaries or tertiary customer at 20 per kg, 15 per kg and 35 per kg respectively. Finally, end consumer gets these products at 25 per kg, 20 per kg and 40 per kg from tertiary customer. Considering the scenario, farmer gets around 40% to 50% of actual retail price and almost nothing left after covering production cost.

In contrast, farmer 2 and farmer 3 together form an association and nominate an agent to run cross-dock hub. Both farmers plant before mentioned vegetables and inbound to Agent-led Cross-dock hub after harvesting. Before harvesting, agent collects tentative harvesting time and prepares harvesting schedule. Thereafter, agent contacts with prospective customers such as Retailer / Super-shop, Wholesaler or exporter and negotiates price, quantity, logistics and intermediary services (Packaging, Warehousing, Transportation, Lead Time, Delivery Destination etc.) as per requirement. After successive negotiation with all legitimate parties, agent settles the price at 18 per kg, 12 per kg and 30 per kg respectively and takes sales order as per harvesting schedule. In these prices, both farmer and customer enjoy higher surplus with more added quality services.

After receiving the products from farmer, agent performs all the logistics and value added services (Packaging, Warehousing, Transportation etc.) at cross-dock hub according to sales order. The agent also prepares Cargo Loading Plan (CLP), route plan and selects proper transportation modes to minimize per unit transportation cost, maintain lead time and optimize delivery. Finally, agent delivers the ordered products at predetermined delivery point/s according to route plan/s.

Afterward, secondary customers sell these products to end consumers at 22 per kg, 15 per kg and 35 per kg respectively. In this scenario, farmers get above 80% of actual retail price and enjoy a much higher margin even after covering production and cross-dock hub costs.

This case reflects that, all the realized benefits of proposed cross-dock based supply chain model for vegetable industry of Bangladesh, those not only increase consumer & producer surplus with value addition, but also decreases the illegitimate parties from chain. This new cross-docked supply chain model is much more stable than traditional SC model, thus ensures the farmer-consumer well-being.

7. Conclusion

Bangladesh is blessed with a favorable environment for producing different types of agricultural goods and we have a reputation of exporting quality agro based goods all around the world. It's an irony that those people who largely contribute to the economic development of Bangladesh are greatly deprived of getting what they deserve because of a faulty supply chain model. This conventional model is depriving the farmers from getting the right price of their produced goods because there are so many layers in between the farmers and the end consumers who make the abnormal fluctuations in the pricing of these agro based

goods. The consumers are also paying high price which make them unable to purchase many of the agro based goods that they need in their lives.

This paper mainly proposed the hybrid cross-docked supply chain model for vegetable industry, led by farmer nominated agent. After analyzing functions of a cross-docked hub, we constructed the alternative cross-docked supply chain model led by agents to manage vegetable supply chain. To overcome the bottlenecks within the existing SC and place the farmers as main driving force, this model illustrates the functionalities of cross-dock hub, the roles of farmers and agents, inbound and outbound transportation, CLP, Multimodal transportation, Route plan, Sales order collection and delivery. In the model, agents are represented not only as a cross-docked service provider but also a market maker on behalf farmers. To ensure a stable supply chain, this model also paves the ways to minimize supply-demand gap and information asymmetry in the entire supply chain. This paper also uses a case study to validate the proposed hybrid cross-docked supply chain model.

Lastly, it may be a fair conclusion to say that this paper makes a significant initial contribution that may advocate to disintermediate the unnecessary parties from existing SC, help farmers to get right price and in the process, enhance value creation as well as, strong & resilience supply chain of vegetable industry of Bangladesh.

8. Limitations

As discussed in brief on Section-V, Bangladesh having huge IWWs which is a prospective crucial internal distribution network. But day by day these IWWs are decreasing due to urbanization and illegally filling up of small rivers to establish new inhabitants' areas will reduce the positive effect of the proposed supply chain model. Also the overall rail way & airport infrastructure of the country is not getting any better. Only efficiency in supply chain like shortening the route through disintermediation can lower the cost of energy here. In reality one or two changes in the scenario can make big time negative impact on the cross-dock based model. We just proposed a structural model. And to implement the model, good CRM (Customer Relationship Management) & SRM (Supplier Relationship Management) need to be in place. These information systems will help to disseminate the market and supply information to match the generated sales order vs the harvest schedule. If there is any mismatch in the information dissemination flow the farmers will get hurt again.

This paper also skipped the impact of material supplier and fertilizer on the vegetable supply chain. Fertilizer alone is big industry with many pitfalls and that industry plays a huge role in the Vegetable production directly and the distribution, hence, the supply chain of HVC (High Value Crop) indirectly.

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