MARKET DEVELOPMENT FOR DISASTER RISK REDUCTION: KAZIPUR VALUE CHAIN ANALYSIS

Value Chain Analysis:
Kazipur Upazila, Sirajganj District

Action for Enterprise

Submitted to:

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EXECUTIVE SUMMARY

Bangladesh is one of the most disaster prone countries in the world regularly suffering from a number of natural hazards. Most disaster responses in the country have followed traditional patterns of relief aid designed without taking market systems into account, and consequently often lead to a culture of dependency amongst the beneficiaries and create market distortions as the markets are flooded with subsidies. Rather than providing distortionary relief "aid," a better approach would be to rehabilitate affected markets and help households reintegrate into these markets and enter into new markets. Relief agencies worldwide are making the transition to more market-oriented approaches in their relief and rehabilitation activities. Many development practitioners and donors have recognized that disaster response efforts need to have economic components in order to facilitate the transition from relief to development. Incorporating market-oriented approaches into disaster risk reduction (DRR) efforts should improve the effectiveness of relief and recovery operations.

The study conducted by Action for Enterprise (AFE) focuses on how improving the efficacy of market-oriented approaches into relief efforts can be accomplished by introducing market-oriented approaches into disaster risk reduction (DRR) efforts. The objective of the study is to utilize this methodology in order to increase benefits for the poor and the 'most vulnerable' through 1) increased sustainability of economic gains, 2) reduced vulnerability from natural hazards, and 3) improved targeting of relief efforts in the event of disasters.

Kazipur Upazila, situated in Sirajganj District, was selected as a target area for this study to pilot this approach because it is particularly prone to natural hazards such as flooding and erosion, as well as due to the presence of on-going DRR projects and the local Disaster Management Committee. The study conducted in Kazipur consisted of the selection and mapping of economic and recovery market systems with an explicit focus on the vulnerability of these systems to specific hazards. Economic markets consist of economic value chains, specifically economically productive value chains within which the poor are active as producers, consumers, and employees. Recovery market systems consist of recovery value chains, those which have economic benefits, but are crucial value chains in relief and reconstruction efforts such as addressing food scarcity, and accessing safe drinking water.

The selection of economic and recovery value chains was based on a cursory analysis of vulnerability to hazards in the Kazipur area. The final two economic chains, *chili* and *cattle,* and the final two recovery value chains, *chira* (dry food), and *tube wells* were selected based on the higher ranking they scored against the selection criteria used in the ranking grid. The mapping process of these value chains generated regional knowledge that is useful in improving the targeting and efficiency of any future disaster relief efforts to rehabilitate the market system in Kazipur. Furthermore, the process produced a series of recommendations and potential facilitation activities for DRR programming aimed at reducing the vulnerability of the market systems from natural hazards.

1. INTRODUCTION OF METHODOLOGY

The purpose of this report is to present the findings of the study carried out by Action for Enterprise (AFE) with the objective of improving the efficacy of market-oriented approaches into relief efforts by introducing market-oriented approaches into disaster risk reduction (DRR) efforts. Our approach is to analyze the selected economic and recovery value chains from input suppliers to end users, and the relationship among them. Potential market-based solutions are identified, which generate potential facilitation activities that can contribute to DRR efforts by addressing major constraints and opportunities

identified during the analysis. Recommended market based-DRR interventions address specific challenges faced by market actors during disasters.

The selected value chains consist of *chili* and *cattle*, as economic value chains, and *chira (dry food)*, and *tube wells* as recovery value chains. The analysis focuses on how the repercussions of Kazipur's regional hazards directly impact the economic and recovery value chains. The study team conducted an in depth analysis, carried out through interviews and focus group discussions with market actors and supporting NGO and governmental agencies, to gain a greater understanding of the factors influencing industry performance, vulnerability, market trends, and the level and quality of support services.

The following sections present the descriptions and findings with regard to each respective economic and recovery value chain. Details for each include the rationale for selection, an assessment of end markets and competitiveness, the repercussions from hazards, an exploration of seasonality issues, a value chain map and description of market actors, constraints due to the vulnerability, market based solutions to address each specific constraint, and recommended market based-DRR facilitation activities. These findings can also be used to effectively target relief and early recovery efforts in the affected value chains in future relief efforts.

1 Map of Kazipur Upazila, Sirajganj District

2. HAZARDS AND VULNERABILITIES

2.1 Kazipur Hazards: Flooding and Erosion

Kazipur Upazila (sub-district), the 138 square mile area, with a population of 234,804[1], located in Sirajganj District, 75 miles northwest of Dhaka is one of the most flood and erosion-prone areas in Bangladesh.[2] The Kazipur *chars* (islands) are extremely vulnerable and prone to flood hazards from the Jamuna River. During the monsoon season, excessive rain causes flooding and water logging. The effects of severe flooding and riverbank erosion on the inhabitants living in the *chars* are significant, resulting in destruction and damage of crops, livestock, property, homesteads, assets, and a shortage of clean drinking water and food.

In Kazipur, flooding is a recurring phenomenon that ensues annually during the monsoon season from June to September. Typically, however, flooding causes damage within tolerable limits, to which *char* inhabitants and farming systems have become well adapted. In fact, small scale flooding in Kazipur is beneficial to farmers and is required to sustain the viability of agricultural crop production for the following reasons: 1) Flood waters produce sediment deposits which act as an effective fertilizer for the soil; 2) the flooding replaces the need for an artificial irrigation system, thereby conserving water and lowering costs; and 3) high rates of evaporation, produced by flood water, remove detrimental salt

[1] Banglapedia

[2]Haque, Chowdhury Emdadul;1988 Impact of River-Bank Erosion Hazard in the Brahmaputra-Jamuna Floodplain: A Study of Population Displacement and Response Strategies. Unpublished Doctoral Dissertation, Department of Geography. Winnipeg: University of Manitoba

deposits on the fields.[3] Occasionally, however, Kazipur undergoes severe floods, as occurred in September 2012, that have detrimental effects on the mainland, and *chars* and its inhabitants. During the monsoon season, the highly localized and long duration of rainfall causes the Jamuna River to rise slowly, which generates excessive water volumes. The river rises and spills onto the land and over the *chars*, causing extensive flood damage to crops and property.

2.2 Vulnerabilities due to Hazards in Kazipur

Due to the slow pace of rising water in the river belt, *char* inhabitants have sufficient time to collect assets, make arrangements and seek shelter on the mainland, in neighboring chars, and in flood shelters. Loss of life due to flooding is atypical. However, inhabitants' homesteads, crops, assets and flood shelters face damage and destruction.

2 Flood Height in Char in 2012

In instances when homes are destroyed, support for reconstruction activities are provided by NGOs and the government as well as by individual initiatives. However, it was noted that the existing process selecting which beneficiaries receive support is skewed and often overlooks the "most vulnerable" due to the demands and influence of the local political leaders.[4] After a severe flood, subsequent rehabilitation actions taken by the government and NGOs include rescue operations, supplying dry food and rice, and the distribution of medicine and rehydration saline.[5] However, in general, *char* inhabitants are not dependent on relief efforts post disaster and prefer to focus on economic recovery activities.[6] Furthermore, Kazipur is not only prone to floods but is also among the worst erosion affected Upazilas in the Sirajganj District, and *char* inhabitants residing close to the river belt can lose their homes and assets to severe erosion caused by flooding.[7] In Kazipur, virtually all land is controlled and productively used, and therefore erosion and the destruction of property leave dwellers in a precarious state.

Traditionally, in flood prone Kazipur, *char* dwellers were able to cope with and benefit from floods because they could predict the timeframe and peak period of the flooding. This allowed growers to calculate appropriate timing for crop cultivation. However, flooding is no longer as consistent as it once was, specifically with regard to timing and duration. Untimely, unpredictable, and erratic flooding destroys crops and causes severe losses for farmers. In 2012, flooding occurred in Kazipur in mid to late September, from September 10-25th, whereas in the past, typical flooding occurred from June to August. At the end of September the river water was flowing 61centimeters above the danger mark.[8] The last time Kazipur underwent a flood with comparable destructive consequences was in 2008.[9] Unpredictable flooding in the *chars* disrupts farming systems and leaves farmers and their families in a perilous economic state.

[3] Banglapedia
[4] Arches
[5] Governmental office, disaster response
[6] Interview with NGO Arches and Interview with *Char* inhabitants
[7] http://www.livingwiththejamuna.com/not-just-displaced-and-poor.html
[8] Water Development Board- http://www.thedailystar.net/newDesign/news-details.php?nid=251794
[9] Interview with *char* inhabitant

3 *Chili Plant*

3. ECONOMIC VALUE CHAIN ANALYSES

4. CHILI

4.1 Rationale for selection of Chili

Because chili is one of the most important cash crops for *char* dwellers and is well suited to *char* soils and climates, it is an integral crop for economic activities in Kazipur. Chili is a highly profitable crop, and most families in Kazipur are involved in chili cultivation, harvesting and processing. Since chili is prevalent throughout Kazipur, it is a highly vulnerable crop to floods and erosion, and disruptions in chili cultivation directly undermine the economic activities of *char* dwellers.

4.2 End Markets and Competitiveness

In Kazipur, one crop of chili is produced per year. The total production of chili is 2,500 hectares at a cost of 600-650 Tk per decimal and an expected yield of10-12 Kg of dry chili. In a good season, the total sale price amounts to 1,000-1,100 Tk per decimal which results in a profit margin of 300-450 Tk per decimal for a *char* chili grower.

There has been a gradual rise in chili demand both in domestic and export markets, however in general, Bangladesh has been unable to meet demand, and therefore has capacity for growth. Typically, chili grown in Kazipur is consumed by the local market; however, national processors do source a marginal supply of chili from the *chars*.

In the *chars*, there is high demand, and subsequently high production, for the local variety of chili which flourishes in the *char* soil. *Char* dwellers prefer the local variety as it produces higher yield and a comparatively higher quality chili, particularly for the ripe red chili. However, these outcomes are only generated when cultivation adheres to a specific timeframe, due to seasonality sensitivities. Disruptions and delays due to hazards faced during chili cultivation will often result in inferior quality and lower yields.

Production and supply of the green versus red chili is dependent on demand and the respective market prices. The supply and price of green chili is volatile, primarily due to demand and annual rainfall. Growers' interests lie in realizing their highest profit margin, and typically the red chili is a more lucrative market. This is in large part due to processors' preference to purchase red chilies as opposed to green chilies, as they are regarded as relatively hotter and more pungent, which is the preferred consumption trend of end users. Hybrid varieties on the other hand, have low demand and are typically regarded by *char* dwellers as "not doing well on our land."[10] However local seed suppliers suggest that hybrid varieties have the capability to produce double the current yield, particularly for green chilies. According to varying seed vendors' experiences, various hybrid varieties such as Jamuna variety of Mallika Seed, Sonic and Premium varieties of Lal Teer, and Bejo Sheetal Seed have the

[10] Interview with *char* inhabitant

potential to produce relatively superior quality chilies and higher yields than local varieties when growers replant seeds. The varieties have potential to produce high quality dry chili and can withstand cool temperature and dew. Therefore, despite *char* dwellers disinterest, the scope to experiment with and expand hybrid technology exists in Kazipur, and can be validated with a field level trial. However, it should be noted that although country-wide trials have been proven to be successful, seed companies have yet to conduct trials for promoting hybrid varieties in *char* areas.

4 Line Growing on Mainland

Char growers in Kazipur cultivate chili using particular agricultural methodologies. Typically, the amount of fertilizer and pesticides farmers apply correlates with how much they can afford. They tend to apply as much as they can financially manage due to the misconception that applying more produces better results. In the *chars*, they have not adopted cultivation techniques that are prevalent on the mainland such as the seedling method or line growing which generates higher yield and decreases pest infestation, instead the *char* dwellers disseminate seeds through broadcasting. A typical farmer produces 10-12 Kg of dry chili, and in Kazipur the majority of chili harvested is red chili, although this is dependent on demand and annual conditions. In terms of drying chili, smallholder farmers sun-dry chili on sand or the ground, which exposes the chilies to insects, dirt, sand, etc. Mid-sized and larger growers store chili for a duration of four to seven months and dry chili in their homes in handmade bamboo containers wrapped in plastic on raised bamboo platforms to protect the chili from flood waters. Small scale growers sell their chili immediately after harvest, to invest in their livelihood expenses and to use their profit for next crop cultivation, and therefore typically do not store chili in their homes.

5 Typical Chili Storage Ground

4.3 Repercussion from Floods

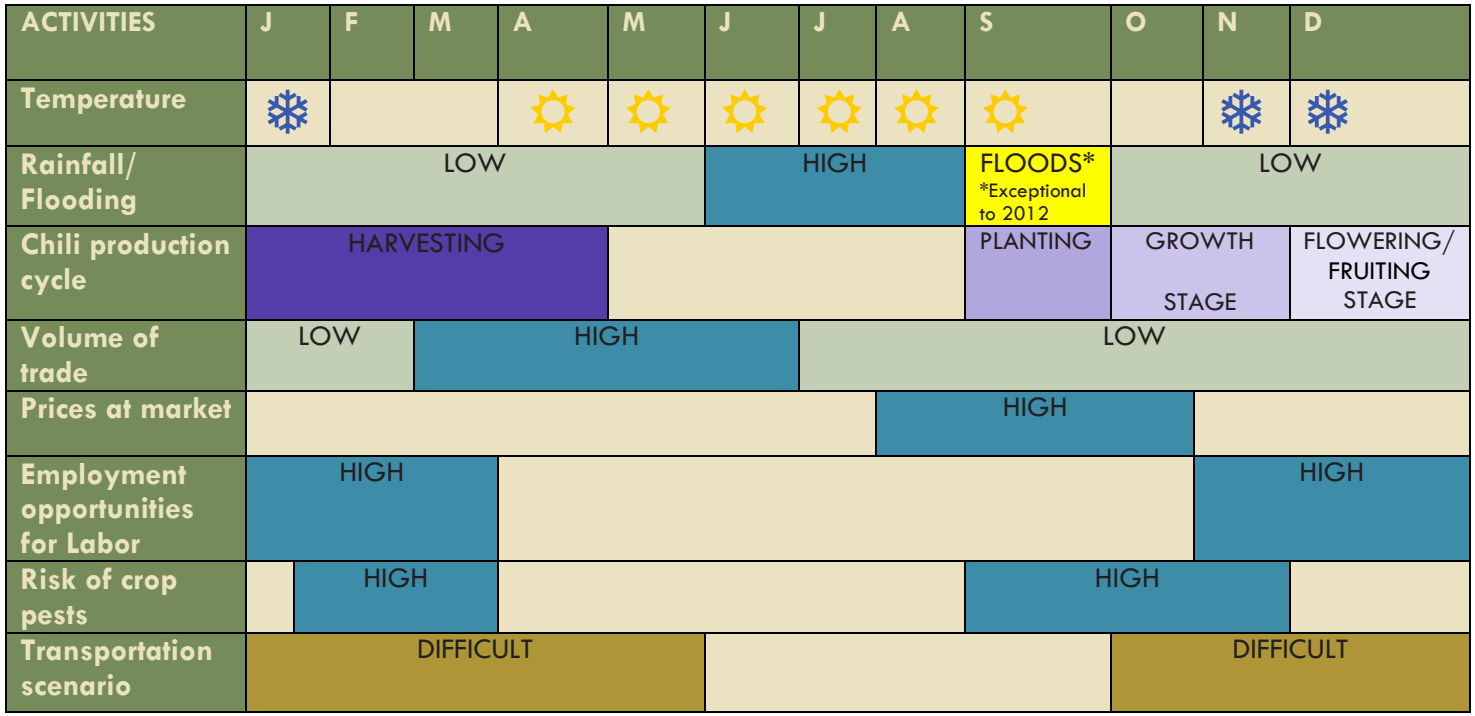
Flooding, a major disruption for chili growers in Kazipur, often results in crop damage, high recovery costs and ultimately a large loss for chili growers and other market actors in the value chain. For instance, the ramifications of the 2012 floods resulted in total loss of the chili crop in many areas in Kazipur. In a recovery effort, chili growers replant seeds to resume cultivation, however typically scale down their production by nearly 40%, from 2500 hectares to 1500 hectares.[11] While replanting, additional costs are required for seeding and plowing which typically amount to 60 Tk per decimal, a 10% increase in overall cost. The floods naturally postpone the sowing of seeds by a couple of weeks. The delay in sowing is detrimental to the crop as it leaves chili vulnerable to the onset of dew and cooler temperatures resulting in significant yield loss. After replanting seeds through seed broadcasting, *char* growers anticipate a minimum of 50% yield loss due to the unsuitable environment for chili growth and the decreased scale of production. Since a big portion of their livelihoods depends on chili production, growers have established a way to mitigate the risk of loss by substituting chili with maize, mustard or wheat as replacement crops. Such crops fare better in the winter, and produce higher yield; however these alternative crops are less profitable as a result of a "scale down" in production. The gross decrease in production is detrimental to the growers.

6 Chili Drying in Soil

[11] Interview with local DAE officials and chili producers, based on actual figures for 2012 flooding

4.4 Seasonality Calendar for Chili

The seasonal calendar seen below for the chili market system exemplifies how planting time and seasons have direct impact on yield of chili. The optimum time for chili planting for the local Balujhuri variety is September and partial harvesting for green chili starts in January and ends harvests with red chili in February to April. Growers can harvest green chili numerous times, while red chili can be harvested only two to three times per year. If however, plantation is delayed beyond September for the popular variety, growers cannot make a profit. Supply increases during the peak harvesting time in March-May but there is ample supply of red chili year round at the Kazipur sub-district *haats* (local market). The chili crop is susceptible to disease and insects during the seedling stage and also at later stages. If there is rainfall during harvesting, the drying process is disrupted which deteriorates the quality of the chili. Transportation from *char* areas is disrupted during dry season and requires more time to proceed from the *char haat* (local market) areas to distant wholesale markets. It should be noted that in 2012 flooding occurred in late September, however this is an atypical occurrence, and can be attributed to climatic change. The flooding in 2012, particularly affected chili cultivation and therefore the following seasonal calendar highlights occurrences in 2012 specifically, as well as demonstrates a "typical" crop calendar.



4.5 Value Chain Map and Description of Market Actors

The following are descriptions of market actors and a map of the Kazipur chili value chain as conceived by the AFE value chain program study team in November 2012. The description of market actors is intended to depict the market actors' functions, interrelationships, demand and supply of chili and critical issues for value chain analysis. Following the descriptions is the map to give a visual representation of the chili value chain.

During the analysis of the chili value chain more than 12 interviews were conducted with market actors and key informants. The primary actors in the chili value chain include the following:

- Input suppliers
- Producers
- Collectors and traders (small, medium and large scale)
- Processors (small, medium and large scale)

As seen in the value chain map in the following section, several market actors may take on a number of different functions. For instance, most farmers produce their own seed and therefore are involved in input supply as well as production.

4.5.1 Input Suppliers

Input suppliers provide fertilizer, pesticides and pesticide spray equipment to chili farmers. Although the growers and Department of Agriculture Extension officials reported that the local chili varieties are vulnerable to low temperatures and provide poor yields if they are planted in late October or early November, the research team's findings suggest that most *char* chili growers use their own seeds and/or purchase local seeds from neighboring growers either from their farm gate and/or at the local *haat*. The study team found that there is little demand for hybrid seeds and most of the growers are not accustomed to growing hybrid varieties. However it was noted that some *char* dwellers collected hybrid seedlings from a mainland nursery in October 2012, following the devastating flood in late September which damaged their standing chili field.

There are more than 12 fertilizer and 6 pesticide shops in Natuapara *char* bazaar and approximately 25-30 shops in the Kazipur sub-district. The local retailers usually collect inputs from the sub district town or from Sirajganj or Bogra district towns. Chili growers often also receive technical support from input suppliers as embedded services.

4.5.2 Producers

Chili production is spread throughout the country but a higher concentration is found in Jamuna riverine *char* and adjacent main land areas. In *char* areas, small scale chili growers (approximately 40%) have less than one acre of land; medium scale chili growers (approx. 50%) have between one to two acres of

land; and large scale chili growers (approx. 10%) have more than two acres of land. Nearly 10,000-12,000 growers produce chili as a cash crop, and it is their main source of income. They consume a portion of their production and sell the remaining volume directly to the traders in open markets or sometimes from their farm gate. Both green and red chilies are sold in the market. Green chili is sold immediately after harvest but red ripe ones need to be dried, packed and stored for selling at a later stage.

The chili growers in Kazipur cite the local varieties as good but very vulnerable to cool temperatures in the early growing stage. Additional challenges include the high cost and limited availability of quality inputs such as pesticides and fertilizers. Moreover, the growers lack technical skills in using appropriate inputs, utilize traditional production techniques (as opposed to modern practices), and have limited access to appropriate post-harvest handling opportunities such as suitable drying ground, storage and preservation.

4.5.3 Collectors and Bulkers

Chili traders play varying vital roles to market local chili in distant markets. Their roles are as follows:

Small Scale Chili Trader

Small chili traders typically buy the green and red chili from growers and transport them to the local market. They also purchase chili from open markets and sell to retailers or large traders in local markets on the *haat* day. They use their own finance to purchase green or ripe chili. In most cases, they sell immediately after purchase but sometimes, they store chili at their homes for a few days to get a better profit margin. There are approximately 200-250 small scale chili traders in the Kazipur sub-district.

Mid-Sized Chili Trader

Mid-sized chili traders purchase bulk volumes of chili from small scale traders as well as minimal quantities directly from chili producers. They sell to large scale chili traders and some are working as suppliers for medium-scale processors to supply ripe chili regularly. The study team met with a mid-sized trader who regularly supplies chili to two food processors (a district level bakery and a *chanachur* maker). There are approximately 50-80 mid-sized traders in the Kazipur sub-district and 10-15 traders from the *char* areas.

Large Scale Chili Trader

They purchase large amounts of chili from small traders, medium traders and a nominal amount directly from chili producers. They collect chili from the local market and transport chili for selling at the national level wholesale market. There are approximately 20-25 large scale chili traders in Kazipur's sub-district.

The study team's findings suggest that most of the traders face problems with transporting chili to the market, a shortage of working capital, and an inability to source consistent quantity and quality of chili due to floods and other disasters.

4.5.4 Processors

Chili processors use green and red chili to make their chili sauce, and red chili powder. There are different types of processors which function in the market as follows:

Small Scale Processors

Small scale processors reside in Kazipur and grind dry chili for sale in the local market, as well as provide services to local growers. There are less than 12 small scale processors in the Kazipur sub-district, and they supply their chili powder to local retailers for direct sale to consumers.

Mid-Sized Chili Processors

There are some mid-sized processors who use chili as an ingredient in their food items (such as in *chanachur*, biscuits, etc.) and regularly buy from agents of Kazipur's sub-district. One agent of a sub-district level mid-sized *chanachur* processors shared that he supplied 300 Kg of chili to their plant per month. In Bangladesh, almost all the districts have several local *chanachur* and biscuit factories who utilize chili.

Large-Sized Chili Processors

Typically buy chili from their selected agents. While the study team did not encounter a supplier of the large scale processors during their field visit, they were informed that such large-sized processors collect chili from *char* areas. There are 6-8 large scale chili processors in Bangladesh who are using local chili as raw materials for making chili powder and supplying and marketing chili powder countrywide.

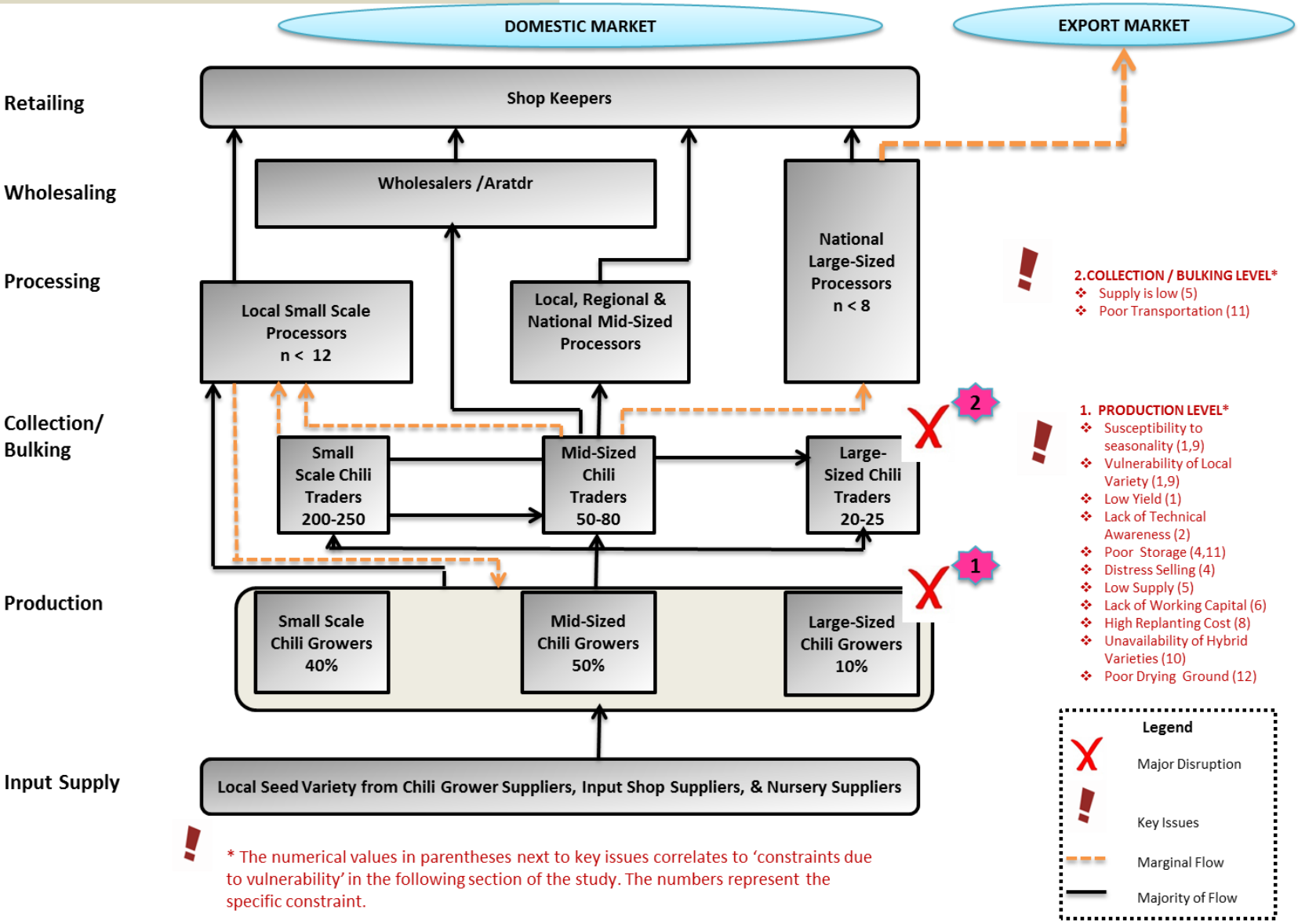
4.5.5 Supporting market actors

Supporting market actors include both private and public-sector entities that are not exclusively tied to the chili value chain. There are no formal banks or micro finance institutions in the *char* areas. Financing for the growers and traders are typically generated from their own sources and/or by informal money lending. Recently, bKash, a subsidiary of BRAC Bank, started operation in Natuapara *char* and promotes mobile banking for the *char* inhabitants and other businessmen. There are private boats to transport chili from *chars* to mainland areas through river ways and subsequently, trucks are used to reach distant wholesale markets. One trader reported that it takes at least 3 days to procure chili from the *char* market for sale in the distant wholesale market, a relatively lengthy amount of time which often proves to be a deterrent to investment by traders.

4.5.6 Enabling Environment

Remote *char* chili growers generally receive minimal extension and technical support from both public and private sector organizations. Perhaps because of this, improved seed varieties and modern farming practices have yet to be introduced to chili farmers. Furthermore, traders face difficulties with transportation, and some have even encountered robbery along trade routes. However, local administrations are extending support for transporting chili by increasing patrols to reduce crime. Moreover, development agencies are also trying to introduce new hybrid and improved seed varieties in the fertile *char* areas.

Kazipur Upazila, Sirajganj District: Chili



* The numerical values in parentheses next to key issues correlates to 'constraints due to vulnerability' in the following section of the study. The numbers represent the specific constraint.

4.6 Constraints due to Vulnerabilities, Market Based Solutions, and Potential Facilitation Activities

A number of constraints due to vulnerabilities were identified in the chili value chain. For each constraint, the team developed potential market-based solutions to the constraint and potential facilitation activities that development organizations may use to support market actors to develop and implement these market-based solutions. Constraints, market-based solutions, and potential facilitation activities can be found in the table below.

	CONSTRAINTS DUE TO VULNERABILITY	MARKET BASED SOLUTION	POTENTIAL FACILITATION ACTIVITIES
1	Post disaster, in an effort to recover loss, farmers immediately replant the next chili crop using the same inputs and seeds that were originally used during initial cultivation. However, due to seasonality issues these inputs do not withstand the cooler temperatures and dew, and result in lower production yield for chili growers.	Access to higher quality (cold tolerant, dew tolerant, etc.) inputs for replanting	Support seed companies to promote higher quality inputs and appropriate production technologies (line sowing, use of seedlings, etc.) Support nurseries to cultivate chili seedlings and market these in the *chars*
2	Farmers lack technical awareness of which variety would be most beneficial in recovery, and therefore resort to what is familiar resulting in crop loss, lower yield, decrease in profit and increased cost for growers.	Access to information regarding chili varieties	See #1 above
3	Unpredictable and delayed seasonal flooding in August-September hampers normal transplantation of the local chili variety which results in lower yield and decreased income of chili growers.	See #1 above	See #1 above
4	Flood water levels reaching homesteads decreases capacity for chili storage at *char* households. Growers' urgency to protect chili increases distress selling to traders at lower prices which inevitably decreases profitability for growers.	Access to raised storage facilities for dried chilies	Support traders, lead farmers, etc. to develop raised storage facilities for rent to chili growers
5	Flooding hampers normal supply of chili in the market and diminishes trading opportunities, which results in lower income for both growers and traders.	See #4 above	See #4 above
6	Post flooding, growers lack access to capital to purchase additional inputs and seeds for replanting, and therefore resort to obtaining loans, with high interest rates, from money lenders.	Access to credit (in cash or in kind)	Support input suppliers to extend credit in-kind to farmers Support financial institutions (e.g. MFIs) to develop loans for growers

7	Once crop is damaged due to floods, rehabilitation efforts are put in place to substitute damaged crops with other crops such as mustard, wheat, and maize. Such crops fare better in the winter, however are less profitable and result in an overall loss for the growers.	See #1 above	See #1 above
8	Post flooding, farmers are faced with additional cost and gross profit loss. Those costs and loss entail: additional seedling and plowing costs, which amounts to a 10% increase in overall cost, a 40% decrease in production, and a 50% expected yield loss.	See #1 above	See #1 above
9	Post disaster, farmers require immediate access to inputs and seeds. The necessity to gain access to new inputs can be hampered by seasonality issues such as the decreased temperatures and the presence of dew which are damaging to local varieties, and result in delayed replantation for farmers.	See #1 above	See #1 above
10	Certain hybrid varieties have the potential to grow well in cooler temperatures and increase yield comparatively well, as opposed to local varieties, however are unavailable at *char*/adjacent shops. Furthermore, the linkages between farmers and input supply companies that source such hybrids are weak. The lack of communication between these two market actors encourage the farmers to use local varieties that cannot withstand cooler temperatures, and therefore generate lower yield.	See #1 above	See #1 above
11	Lack of reliable transportation during and post floods requires growers to store chili in a protected storage or in neighboring relatives' homes. However, since storage infrastructure is often unavailable and boats don't adhere to regular transport schedule, chili growers often resort to selling their chilies out of desperation at a lower price to traders during and after disasters.	See #4 above	See #4 above
12	Lack of drying ground infrastructure leads farmers to use sand or roof tops for drying chili. However, during flooding, flood water saturates the ground and roofs and as a result inhibits proper drying of chilies and diminishes quality, which results in a lower selling price for the growers.	Access to improved drying techniques and/or drying grounds	Support traders, lead farmers, etc. to promote improved drying techniques and/or establish improved drying grounds for rent to farmers

13	Weak and non-elevated homes and flood shelters result in complete destruction due to river erosion and flooding and leave *char* dwellers in a precarious state, requiring them to rebuild homes.	See #4 above	See #4 above

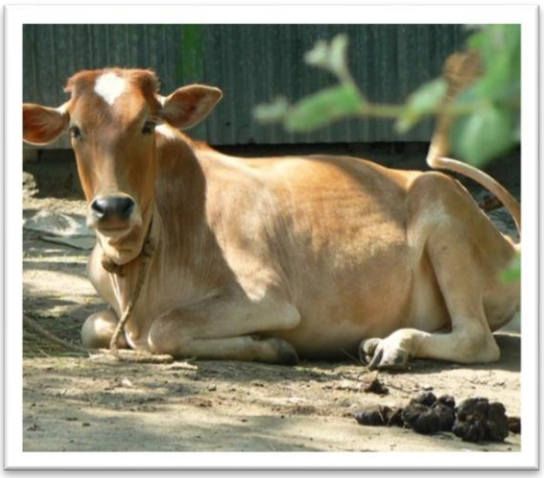
A set of potential facilitation activities aiming to reduce vulnerability in the chili value chain include supporting:

- seed companies to promote higher quality inputs and appropriate production technologies (line sowing, use of seedlings, etc.)
- nurseries to cultivate chili seedlings and market these in the *chars*
- processors, traders, lead farmers, etc. to develop raised storage facilities for rent to chili growers
- input suppliers to extend credit in-kind to farmers
- financial institutions (e.g. MFIs) to develop loans for growers
- processors, traders, lead farmers, etc. to promote improved drying techniques and/or establish improved drying grounds for rent to farmers

4.7 Implications for Relief and Recovery Efforts

Given the importance of planting appropriate varieties of chilies at the proper times, relief and recovery efforts should focus on rehabilitating input suppliers, and ensuring that appropriate varieties of chili seeds and seedlings (or alternative crops) are available for farmers to purchase. In the event of late on-set floods in September or later, it becomes even more critical for farmers to receive access to inputs as soon as possible.

5. CATTLE



5.1 Rationale for selection of Cattle

Cattle maintains particular importance in Kazipur, as small scale to mid-sized cattle rearing for beef fattening purposes is popular among *char* households, as it provides an alternative source of income to agricultural crop cultivation. In general, due to mobilization capabilities, cattle can withstand imminent destruction from flooding and river erosion, and therefore the cattle value chain serves as a purposeful point of comparison to more immobile livelihood options like chili. Cattle are particularly valuable assets for *char* households, which generate income as production is steadily employed throughout the year. While cattle can be utilized for both beef fattening and dairy production purposes, Kazipur cattle owners predominately engage in beef fattening for income generation, as milk production is not a significant contributor to livelihoods.

5.2 End Markets and Competitiveness

In general, there is unmet demand for livestock products in the *char* and mainland markets. For both beef and dairy products, there is a large gap between supply and demand for the majority of the year, as supply is relatively low and demand is consistently high. Beef fattening takes prevalence over dairy production in the *chars*, primarily because it is a comparatively more profitable market and *char* inhabitants have ample access to inputs such as natural grass, a viable source of feed for fattening purposes. While demand for cattle and cattle products is regularly unmet, demand soars during particular periods and festivals such as *Eid-ul-Azha* in October, when beef is used for household consumption. Supply on the other hand, vastly increases in May and June, namely because cattle are at their healthiest state and well fed, as farmers are able to benefit from abundant access to natural feed, specifically grass, from February to May. It is to their advantage to sell cattle at this point in the season, as natural feed is sparingly available in the lowlands during the monsoon season.

7 Cattle in Natuapara Market

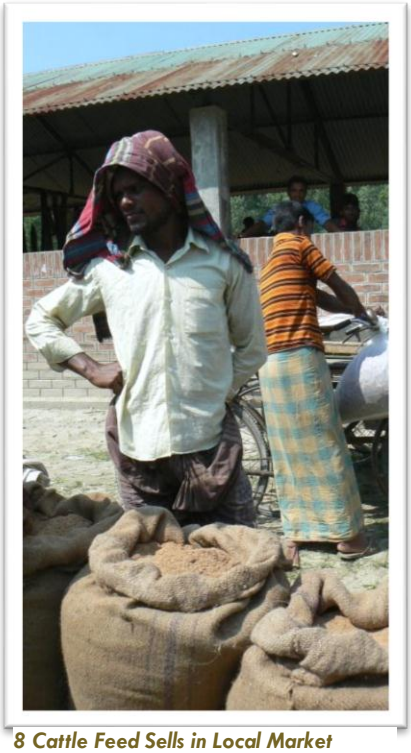
In *chars* there is high demand from mainland consumers for young aged (2-3yrs) local breed cattle as the hybrid breed is less popular and considered to be "less tasty".[12] In Kazipur pricing of local cattle ranges from 15,000-40,000Tk and is contingent on varying factors such as size, age, and timing. Cattle are typically purchased by traders from the *chars* and sold on the mainland. Due to cattle farmers' lack of market awareness, sales pricing is generally determined by traders who dominate the local market.

[12] Interview with *char* inhabitant

Consequently, the majority of sales profit goes to traders and purchasers, the mainland actors, as opposed to the farmers, the *char* actors.[13]

Cattle rearing for beef fattening requires minimal labor, 1-2 hours per day, and is typically managed by household members. Poorer households on the *chars* are often unable to procure cattle due to the lack of capital required to purchase cattle, however beef fattening remains highly popular as only a small amount of homestead land is required to rear one or two cattle. Therefore, small scale farmers typically partake in "share cropping," in which an agreement is made between the farmer and cattle owner that the farmer will manage the cattle and both parties will secure 50% of the gross profit margin.

Despite lack of information and knowledge gaps , beef fattening is a widespread practice in Kazipur, and farmers fatten cattle to the best of their abilities. Young calves are typically procured from the mainland and from neighboring *chars* during the "calving season" and sparingly throughout the rest of the year. In general, the selection process is vital to subsequent successful rearing outcomes, and it is beneficial for the purchaser to select cattle with certain characteristics specific to age, weight, and shape. However, in Kazipur, cattle purchasers often lack necessary technical awareness required to procure ideal calves. Cattle rearing entails feed management and general care of cattle, including deworming and vaccinations. However, farmers in Kazipur are generally not aware of variations in feed types, and appropriate proportions that have the capacity to generate superior results. For instance, *char* farmers provide cattle with grass and concentrated feed, whereas packaged or ready-made feed is more balanced and produces better results as it accelerates the fattening process. Similarly, *char* inhabitants have limited access to capital and are unaware of the benefits of regular vaccinations and medications. Moreover, there is not a sufficient supply of vaccinations, like anthrax, to meet demand, as there currently are no private vaccination companies in country for these services. Furthermore, remote *char* areas have limited access to service providers from the mainland (including government officials) which supply medications and vaccinations, leaving *char* cattle more vulnerable and susceptible to disease. There are currently two paravets with permanent shops providing services at Natuapara *char*, and only approximately 30-35 paravets, a relatively low proportion to cattle, providing advisory and technical services to *char* and surrounding communities in Kazipur sub district.



8 Cattle Feed Sells in Local Market

5.3 Repercussion from Floods

Flooding in Kazipur has significant detrimental effects on cattle which are worsened due to the existing vulnerable state of *char* inhabitants. Mortality rates for cattle post-flooding is low at 2%, however, the severity of disease is heightened particularly in the months of August and September.[14] There is a lack of cattle shelters in Kazipur and so in an effort to protect their most valuable asset, farmers move cattle to higher ground such as embankments. Since farmers in the *char* areas often neglect to provide cattle with

[13] Interview with CLP
[14] Interview with DLS

regular vaccinations, cattle located on the *chars* are more susceptible to preventable disease. Therefore reactive measures are taken as service providers collaborate to deliver medications for infected cattle. Post flooding the government organizes a vaccination and treatment campaign which aims to minimize the spread of disease; however the efforts are often unable to reach those living in remote areas due to limited manpower.[15] Similarly, because disease is rampant at these times, the demand for vaccinations is high resulting in an insufficient supply of various vaccines. Due to the lack of availability, inhabitants of remote *chars* are unlikely to receive such services.

Post disaster there is high demand for cattle feed, as feed and straw are destroyed during flooding. However, due to increased prices as a direct result of heightened demand during the monsoon season as well as poor linkages to mainland feed suppliers, *char* cattle are left vulnerable. Findings indicate that cattle are often without feed for up to three days after floods.[16] During disaster, transportation is often disrupted and so transport schedules to and from *chars* are irregular, and therefore efforts to manage these vulnerabilities are arduous.

5.4 Seasonality Calendar for Cattle

All year round there is available supply of cattle in *char haat* areas; however, supply is reduced during flooding. During flooding a reduced supply of cattle in the open market as well as fewer buyers leads to reduced prices for cattle. Moreover, higher disease prevalence for cattle occurs during floods because of increased vulnerability due to stagnant water, poor feeding opportunities, and lack of regular vaccination. Vaccine supply is also disrupted for some diseases as the Department of Livestock Services (DLS) is the only supplier in the country, and is unable to meet sudden spikes in demand. It should be noted that in 2012 flooding occurred in late September, however this is an atypical occurrence and can be attributed to climatic change. Therefore, while the following seasonal calendar reflects the occurrences of 2012, it also illustrates a "typical" cattle (fattening) seasonal calendar.

ACTIVITIES	J-12	F-12	M-12	A-12	M-12	J-12	J-12	A-12	S-12	O-12	N-12	D-12
Rainfall/Flooding	LOW					HIGH			FLOODS* *Exceptional to 2012	LOW		
Fattening cycle	FATTENING CYCLE											
Festivals								EID		EID		
Fodder availability	MEDIUM	LOW		HIGH		LOW				MEDIUM		
Volume of sales					HIGH		LOW	HIGH	LOW	HIGH	LOW	
Prices at market					MEDIUM			HIGH		HIGH		
Risk of diseases	LOW		MEDIUM		HIGH					MEDIUM	LOW	
Availability of vaccination						LOW						
Transportation scenario	HIGH COST					SPECIAL ARRANGEMENTS					HIGH COST	

[15] Interview with DLS
[16] Interview with Red Crescent

5.5 Value Chain Map and Description of Market Actors

During the analysis of the cattle value chain more than 10 interviews were conducted with different market actors and key informants. The primary actors in the cattle value chain include the following:

- Input suppliers (local calf/young cow producers, distant calf producers, calf traders, feed suppliers)
- Producers-Cattle farmers (small scale and large scale)
- Collectors and traders (*char* and mainland)
- Processors (*char* and mainland)
- Wholesalers


Calf Input


Livestock Trader


Cattle Market


Transporting Cattle

5.5.1 Input Suppliers

Input suppliers of the cattle fattening value chain are limited to calf/young cow producers, feed and vet/vaccine suppliers. A majority of input suppliers are farmers themselves (for calves, feed, straw, grass etc.) however for vet/vaccine supplies farmers always depend on local paravet shops. The study team found that there is little demand for packaged feed, rather farmers use concentrated feed only for one-to-two months before selling their cattle. They go to local paravets to get vaccines and other veterinary services for their cattle as there are no regular treatments scheduled from either the local DLS or local paravets. There are two paravets with permanent shops in Natuapara *char* but another 30-35 paravets providing services at a community level. Most paravets received direct training from the local DLS, Char Livelihoods Project (CLP), or other NGOs.

5.5.2 Producers: Cattle Rearers

Small Scale Rearers

Most of the cattle farmers are small scale, having one to two cows for fattening. Some farmers may own the cows themselves and others take part in "share cropping" from neighboring land owners. In cases of share cropping, the farmer receives the cattle for rearing immediately after purchase by the owner under

the condition they will take care of the cattle. The profit will then be distributed in equal shares between the owner and farmer. The small scale farmer employs only family laborers for rearing cattle.

Large Scale Rearers

There are also some large livestock farmers having 3-10 cattle for fattening on a commercial basis. Most of them employ hired labors to take care of the cattle. The livestock farmers are knowledgeable farmers and have good linkages with livestock service providers as well as with related governmental and non-governmental officials.

5.5.3 Collectors and Bulkers: Cattle Traders

There are two types of cattle traders in the study area and they are:

Char Traders

They reside in the *char* areas, buy cattle from farm gate for selling in the *haat*, and most of the time they assist individual cattle owners with selling on *haat* days. Approximately 200-250 *char* traders are involved in the business, and some of them also collect cattle from the mainland for selling in the renowned Natuapara *Haat*, a large cattle market in Kazipur Upazila. During flooding, normal markets are generally closed, but the *char* traders play a vital role in selling cattle to the distant mainland traders during these times.

Mainland Traders

The mainland traders also play a crucial role in collecting and bringing cattle to the market. They bring cattle for selling from the mainland to the *char haat*, as well as purchase from the *char haat* for selling in the mainland. These traders have good linkages with distant traders and some of them send cattle to institutional buyers.

5.5.4 Processors and Retailers

Cattle sold for processing are sent to local level processors in *char* and mainland areas.

5.5.5 Wholesalers

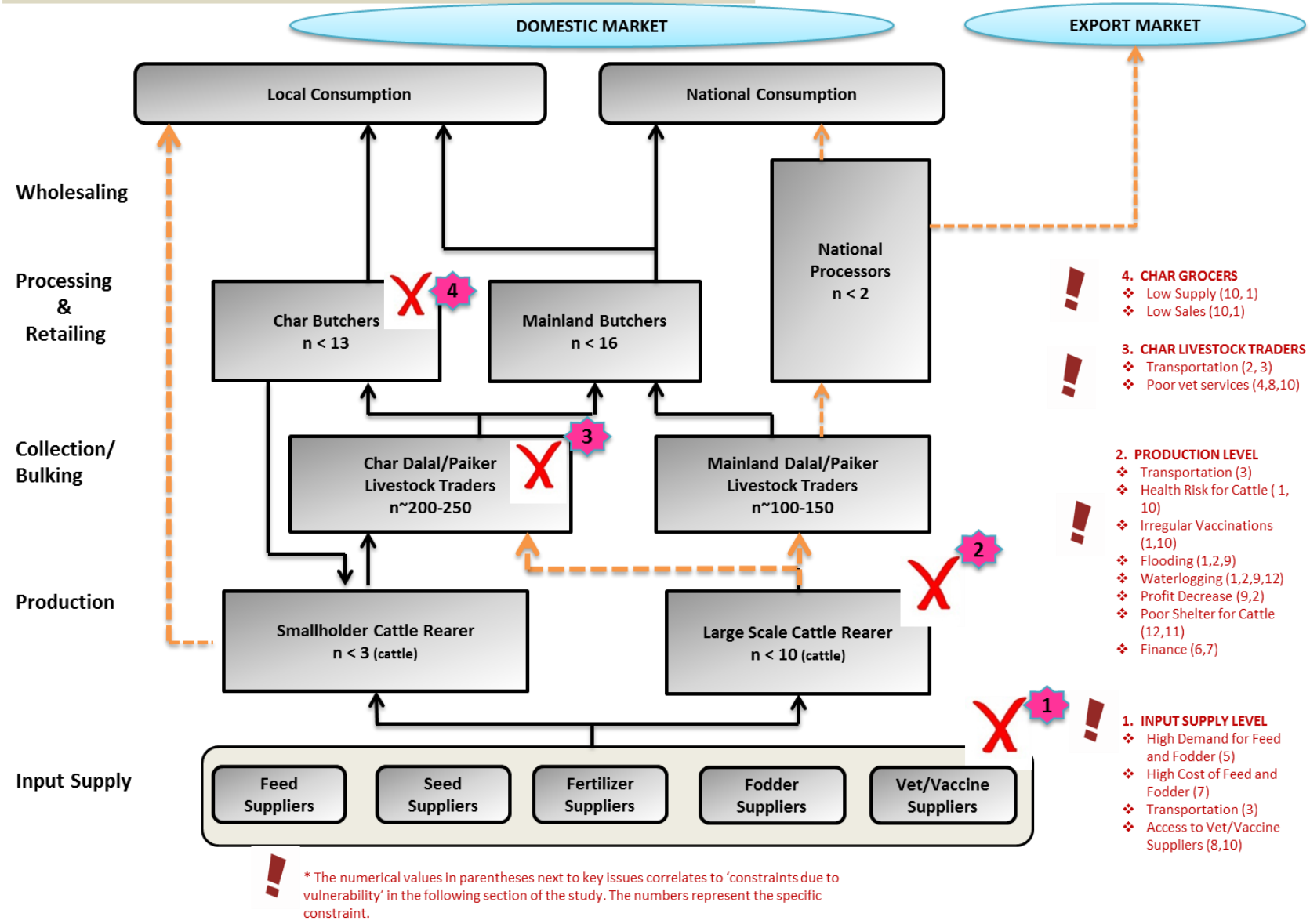
Char Butchers

Char butchers are the key meat sellers in the local *char* areas supplying meat to *char* inhabitants as well as to mainland inhabitants. There are approximately 10-12 *char* butchers in Kazipur sub district. Each butcher slaughters three to seven cattle per week. Generally, all butchers collect low grade cattle at a lower rate and keep their meat price within an affordable range to increase profitability.

Mainland Butchers

Mainland butchers are also key meat sellers in the local mainland areas supplying meat to mainland inhabitants. There are approxiametly12-15 mainland butchers and each butcher slaughters three to seven cattle weekly. Typically all butchers collect low grade cattle at a lower rate and maintain price within an affordable range to increase profitability.

Kazipur Upazila, Sirajganj District: Cattle (Fattening)



5.6 Constraints due to Vulnerabilities, Market Based Solutions, and Potential Facilitation Activities

A number of constraints due to vulnerabilities were identified in the cattle value chain. For each constraint, the team developed potential market-based solutions to the constraint and potential facilitation activities that development organizations may use to support market actors to develop and implement these market-based solutions. Constraints, market-based solutions, and potential facilitation activities can be found in the table below.

	CONSTRAINTS DUE TO VULNERABILITY	MARKET BASED SOLUTION	POTENTIAL FACILITATION ACTIVITIES
1	Post flooding cattle are prone and vulnerable to diseases, and an increase in disease is exacerbated since *char* dwellers lack the technical capacity to provide their cattle with regular vaccinations which would reduce disease and minimize risks to hazards.	Increase access to regular vaccinations for farmers prior to flooding	Support DLO and paravets to provide regular vaccinations, possibly through setting up regular "vaccination camp" for farmers to bring their cattle
2	Flooding and water logging reduces scheduled nursing of cattle fattening, which inhibits cattle development and results in poor health and decreased income for cattle farmers and owners due to decreased sales price.	Increase access to feed for farmers during flooding time	Support lead farmers, paravets, etc. to introduce improved feed cultivation and storage techniques
3	Ramifications of flooding distorts transportation services from *chars* to the mainland, rendering *char* cattle farmers and *char* traders more vulnerable to irregular transportation times and therefore decreased access to the mainland market.	Increase access to regular transportation for *char* inhabitants during flooding	Support transportation service providers to provide access to boats to the *chars* during disasters
4	At the union level, the local DLS implemented a service, SebaKormi, which provides voluntary services to assist *char* areas post flooding. However, this voluntary service is not very effective as it was proclaimed to be mismanaged, consisting of a low number of voluntary participants. Therefore, during flooding, *char* inhabitants in remote and inaccessible areas often do not receive governmental support services.	See #1 above	See #1 above Support the capacity building of paravets to provide service to farmers after flooding, particularly in remote areas
5	There is high demand for cattle feed post disaster, and local DLS officials requested (post 2012 floods) to include cattle feed as part of disaster response where feed would be distributed to *char* inhabitants.	See #2 above	See #2 above

	However, this regulatory proposal is likely to be declined as a post disaster priority for response is focused on human conditions rather than economic activities.		
6	Post flooding "seasonal migration" ensues and consequently *char* inhabitants are unlikely beneficiaries for micro-credit programs which provide farmers capacity to purchase cattle for fattening purposes on credit, since tracking and monitoring beneficiaries are inhibited post migration.[17]	Access to information about seasonal migrants for MFIs	Support financial institutions (e.g. MFIs) to develop systems to track migrating farmers
7	Post monsoon season fodder and feed are particularly expensive due to increased demand which causes additional financial burdens for cattle farmers who are already in a precarious financial state.	See #2 above	See #2 above
8	Limited access to capital inhibits farmers and owners to supply appropriate medications and vaccinations for cattle making cattle more prone to disease during flooding.	See # 1 above	See #1 above
9	Flooding and water logging damage increases as river water dampens feed and fodder. Decreased availability of feed and fodder results in decreased health and increased vulnerability of the cattle, often where cattle do not have access to feed for 3 days[18], which ultimately lessens the cattle profitability for farmers and owners.	See #2 above	See #2 above
10	Irregular and limited supply of vaccinations results in heightened disease for cattle post flooding, which ultimately lessens/eliminates cattle profitability for farmers and owners. For instance over 300 cattle died in the Kazipur 2012 floods because of irregular vaccinations.[19] Accessibility to and awareness of vaccination inputs could prevent cattle mortality during flooding.	See # 1 above	See #1 above
11	While some areas in Kazipur have shelter access during flooding for human life, there are no cattle shelters. As	See #2 above	See #2 above

[17] Arches
[18] Red Crescent
[19] Interview with paravet

	a result, cattle farmers and owners choose to protect their most valuable asset by remaining with their cattle on raised land, however, inputs such as straw and feed are completely vulnerable to river water damage. Therefore, while cattle life is safeguarded, necessary inputs that are vital for cattle vitality are destroyed, leaving cattle in and endangered state.		
12	Cattle are prone to disease post floods, primarily due to stagnant water and unhygienic cattle shed facilities. As a result of heightened disease, cattle profitability for farmers and owners is ultimately lessened.	See #1 above	See #1 above

A set of potential facilitation activities aiming to reduce vulnerability in the cattle value chain include supporting:

- DLO and paravets to provide regular vaccinations, possibly through setting up regular "vaccination camp" for farmers to bring their cattle
- lead farmers, paravets, etc. to introduce improved feed cultivation and storage techniques
- transportation service providers to provide access to boats during disasters
- paravets in providing service to farmers after flooding, particularly in remote areas
- financial institutions (e.g. MFIs) to develop systems to track migrating farmers

5.7 Implications for Relief and Recovery Efforts

During relief and early recovery efforts, priority should be given to working with market actors to ensure access to cattle feed as well as vaccinations and other veterinary services in the immediate aftermath of flooding. Additionally ensuring access to adequate transportation services for market actors should also be a high priority.

6. RECOVERY VALUE CHAIN ANALYSES

7. DRY FOOD: *CHIRA*

9 Chira

7.1 Rationale for selection of *Chira*

Flooding in Kazipur is an annual phenomenon and typically the nature of the gradual flooding does not require considerable relief response to ensure food security as households are able to resume normal eating habits. However, there are times when flooding becomes severe and demands massive emergency relief operations in order to reduce suffering of those most affected. In the immediate aftermath of such disasters, when there is no access to cooking facilities due to a lack of dry wood or manure, distribution of and access to dry food such as *chira* (flattened rice or beaten rice), *muri* (puffed rice) and *gur* (molasses) are critical for relief measures. Despite the fact that *chira* is produced locally and in surrounding areas, many key informants mentioned difficulties in sourcing *chira* for recovery efforts. Therefore our analysis focuses on *chira* mills' production capabilities, and linkages between local sourcing and procurement of *chira* by government and NGOs.

7.2 End Markets and Competitiveness

Chira is produced locally in Sirajganj and surrounding areas throughout the year. In Sirajganj district there is a single *chira* mill which has the capacity to produce 8 metric tons/day but is currently producing 3.5 metric tons of *chira* per day due to capacity. However, on any given day there is a sizable amount of 17.5 tons of *chira* in stock which is turned over every five to seven days. Under suitable storage conditions, *chira* can be stored for up to 30 days. 40 kg of high quality paddy, typically sourced from Bogra, are required to produce 22 kg of *chira*, which is typically procured from wholesalers and in open markets.

Demand for *chira* is gradually increasing, and peaks during times of disaster. There is a large market for *chira*, specifically from large processors who use *chira* as an ingredient in popular snacks like *chanachur*. Demand for local consumption peaks during Hindu festivals in October, as well as during fruit harvesting season from April-June. However, in general there is a declining trend among household consumption to eat unprocessed *chira*. Nonetheless, demand is consistently high throughout the year and all *chira* produced and stored is sold in Sirajganj within 7 days.

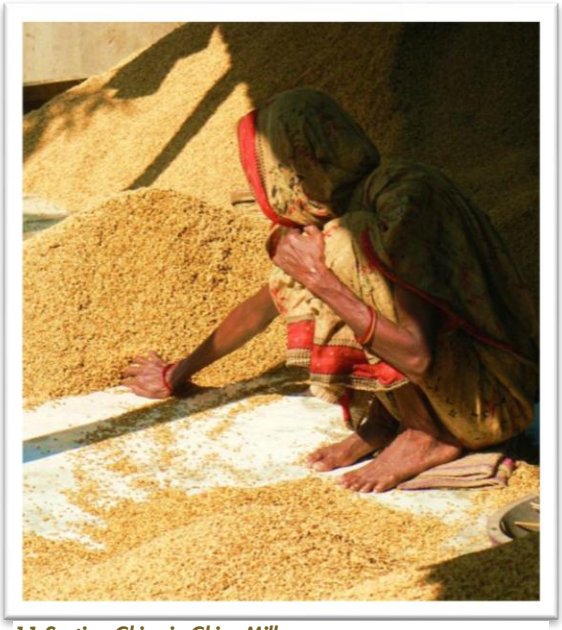
The Sirajganj mill, Jananani, has the capacity to sell *chira* to large sized national processors, however high costs for transportation and taxes dissuade processors from procuring from the mill. Therefore, while the mill supplies *chira* to some national processors in Dhaka; it largely sells to local wholesalers and retailers in Sirajganj. Capacity to supply is high, and therefore the mill can meet any requests, regardless of quantity..

10 Local Sirajganj Chira Mill

The production process at the Sirajganj mill consists of both manual and automated labor. Labor wages for the Sirajganj mill are approximately 200-250Tk per day while males traditionally employ larger machinery and automated machines, earning a higher wage, and females conduct the sorting process earning a lower wage. The *chira* mill employs 25 laborers, and the mill

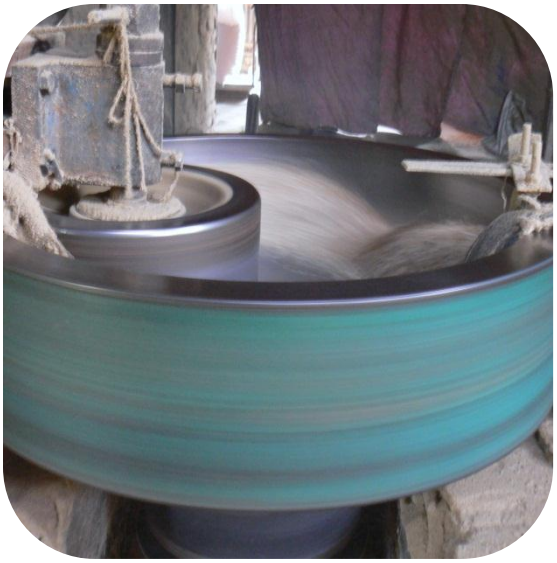
requires 6 people at any given time, despite fluctuations in demand, for the production process.

The neighboring Bogra district has a more competitive landscape as there are 10 large sized *chira* suppliers in close proximity. These mills have large scale automated operations and one such mill has the capacity to produce 12 metric tons/day and currently produces 10-11 metric tons per day. Its clientele are mainly wholesalers and traders specifically procuring from Bogra district. Therefore, it is not a direct competitor with the smaller Sirajganj mill since traders who source from the Sirajganj mill do not source from it. Typically, sales are high and demand consistent, so *chira* is not stored. However, this mill has the capability to store *chira* for up to 30 days. Demand is high and peaks from May to June and around 22 laborers are required for optimal functionality.



11 Sorting Chira in Chira Mill

For both small scale and large sized *chira* mills, a dependable source of electricity is required for production, as much of the process is automated. Therefore, unpredictable disruptions in electrical service hinder production as it suppresses capacity to produce and potential for growth. In fact, one *chira* mill in Bogra stated that due to electrical outages, they withstand a 25-30 kg paddy loss per power cut. Therefore, they've implemented alternative coping mechanisms such as commencing their production shift at 3am to avoid load shedding and ensure continual access to electricity. The Sirajganj mill is functioning under exceptional circumstances, as it was given permission by the government to have continual electric access. In 2011, during a visit from the District Commissioner, it was determined that the Sirajganj mill be given particular privilege to connect to 2 electric utility lines, so that in times of emergency disaster it will have the capacity to supply *chira* for governmental and NGO procurement. This advantage is specific to the Sirajganj mill as no other mill currently benefits from this opportunity. This situation exemplifies how a slight change in regulatory policy has tremendous potential for positive impact on a company's success as well as the capacity to vastly improve relief response. Due to the authorization made by the District Commissioner, the Sirajganj mill can now be counted on as a dependable local supplier of large quantities of *chira* in times of flooding.



12 Chira Grinder

7.3 Repercussion from Floods

While flooding in Sirajganj is an annual occurrence, the floods of 1988, 1998, 2004, and 2007 were particularly catastrophic, resulting in large-scale destruction and loss of life. During field visits, various market actors continually recounted detriments of the 2004 floods, and the economic losses incurred. In 2004, Bangladesh experienced one of the most devastating floods in nearly 50 years. The floods inundated about 38% of the country, and approximately 747 people lost

their lives.[20] In an attempt to mitigate the impact of flooding, the government and local and international NGOs implement various relief initiatives, such as dry food distribution to the most vulnerable. Therefore, demand for dry foods vastly increase during times of disaster, and relief agencies prefer to source locally. *Chira* is of particular importance to the Sirajganj District as there are local producers in the immediate and surrounding areas.

However, while conducting the study, local NGO leaders recounted that in times of flooding there is an insufficient supply of *chira* in Sirajganj. For instance, in 2004 and 2007 local NGOs were looking to procure *chira* during the floods, but were unsuccessful and therefore conceded their search, and instead collected dry food from distant areas. This information was validated by the Sirajganj and Bogra mills. The manager of the Sirajganj mill stated that in 2004 and 2007 there was huge demand for *chira* from the government and NGOs that they could not meet, as supply was limited. At the time the mill had half its current capacity and produced less than 2 tons of *chira* per day. However, the current scenario has changed, as nowadays they have the ability to produce over 4 tons per day, namely due to increased automation and the authorization granted by the Commissioner, who allowed the mill to have consistent electric access.

"We now produce over 4 tons capacity of *chira* and can supply it in times of flooding."
Rajon, Sirajganj Mill Manager 2012

Similarly, the Bogra mills reiterated their inability to meet demand during disasters in the past, stating that in 2004 and 2007 the mills did not have the capability to meet full demand. However due to increased capacity, the Sirajganj mill and Bogra mills now have the collective capacity to meet any demand, irrespective of quantity, if a disaster were to occur. In spite of this improved capability, various local NGO executives are still under the misguided impression that they currently cannot source *chira* locally. Therefore, an information gap exists between local procurers and suppliers, namely, local procurers are unaware of the magnitude of *chira* readily available. This disparity could be attributable to several factors. Perhaps it is only local NGO executives who are unaware of the local market capabilities, while implementers are more knowledgeable of viable procurement sources. Or perhaps it is because 2007 was the last time the Sirajganj district endured a severe flood and a current market analysis has not yet been conducted by local NGOs.

In general, there are weak linkages between NGOs and suppliers, perhaps because NGOs do not have a clear picture of suppliers' capacity. Therefore, NGOs typically source *chira* from wholesalers at higher prices. A few NGOs do have direct linkages to the suppliers. For instance, the local Red Crescent has a keen sense of the local market and procures *chira* from the Sirajganj mill, among others, through an open tender offer at a lower cost. The local Red Crescent representative stated that in two days he is able to source whatever quantity of local *chira* necessary.

7.4 Seasonality Calendar for *Chira*

The following calendar demonstrates how seasons have a direct impact on the availability of chira as sudden demand increases during flood times or times of other natural disasters. Mostly, chira is distributed

[20]WARPO, 2005

to feed flood affected people when they cannot cook their own food and/or take shelter in the shelter houses. The price of chira spikes during the first days of flooding, but gradually reduces and levels out after a short time. The pricing and demand of chira depend on the severity of disasters and numbers of people affected during the time of disasters.

Beyond times of disaster, there is increased demand for chira during the month of Ramadan as some Muslims consume the product during this festival season. One processor cited that very recently chira demand increased during the months of April-June when there are abundant fruits in Bangladesh.

ACTIVITIES	J-12	F-12	M-12	A-12	M-12	J-12	J-12	A-12	S-12	O-12	N-12	D-12
Rainfall/ Flooding	LOW					HIGH			FLOODS *Exceptional to 2012	LOW		
Volume of sales					HIGH			HIGH				
Prices at market									HIGH			
Demand				HIGH								
Significant Events				FRUIT SEASON			RAMADAN					

7.5 Value Chain Map and Description of Market Actors

During the analysis of the *chira* dry food value chain more than six interviews were conducted with market actors and key informants. The primary actors in the *chira* value chain include the following:

- Input Suppliers
- Processors
- Retailers


Paddy Inputs for *Chira*


Processing *Chira*


Processed *Chira*


Chira Retailers

7.5.1 Input Suppliers

The raw material suppliers include the paddy farmers, traders and necessary tools/machinery suppliers. Mostly, the traders collect the same varieties of paddy from the open market, and supply regularly at the mill gate. There are different varieties of paddy but BR-11, *Swarna*, BINA-7, BRRIDHAN-28, BRRIDHAN-29 and hybrid *Hira dhan* are suitable for making good quality *chira*. Beyond the paddy, the mill owner collects machineries and spare parts from local markets.

7.5.2 Processors

The processors are using paddy as a raw material for making chira. There are three (two small and one large) processors of chira in Sirajganj district. Among them, one renowned processor, Janani Chira Mill, is

currently functioning and regularly supplying 3.5 tons of chira to two national food processing companies. This factory is not running at full capacity and can add more lines to supply emergency needs, or can deliver to other food processors on a regular basis. The owner assured supply of chira at the food processing company gate in a regular manner. Moreover, there are more than 10 chira mills in neighboring Bogra districts and chira is supplied by the mills through retail networks in northern Bangladesh.

7.5.3 Retailers

Generally, retailers sell *chira* in the open market, and some grocer shops keep *chira* as one of their food items. Distant retailers come to purchase and collect *chira* from the mill gate, and *chira* processors supply *chira* to local retailers and grocers on a weekly basis.

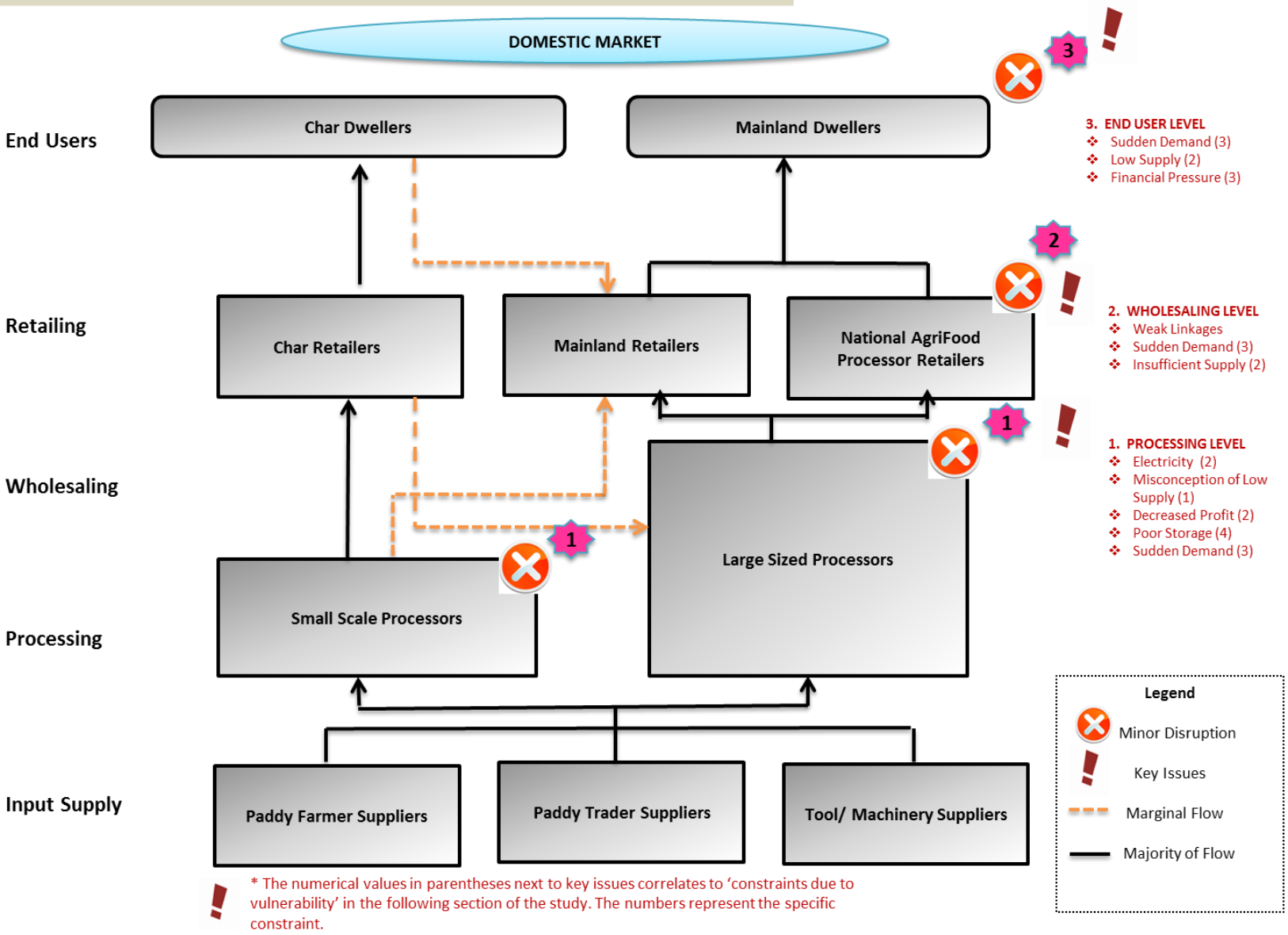
7.5.4 Supporting market actors

Supporting market actors include both private and public-sector entities that are not exclusively tied to the *chira* value chain. Formal banks and microcredit organizations provide loan support for running the businesses of processors, as well as production and trading activities for raw material suppliers. The processors cited that high interest rates and load shedding (power cuts) are hindering their business growth and profit margins. There are private transport services to transfer *chira* from the mill gate to distant processors, or to supply to the retailer level, but high tolls on the Jamuna Bridge make the local *chira* mill owner uncompetitive with Dhaka mill owners. One processor suggested that if there were fewer tolls, then they could supply different food processors based in the Dhaka division.

7.5.5 Enabling environment

The local district administration has marked *chira* as a strategic food item during times of flooding, and allowed uninterrupted power supply for *chira* production at the Sirajganj Mill. This support ensured quality of *chira* production as well as efficient use of the raw materials. Suitable paddy varieties are available in the open market and have easy access to transport at the factory level. Many informants from the NGOs stated that there was less supply of *chira* during times of flooding in 2004 and 2007. However, currently there is a huge supply at the factory level which can meet the demand of sudden floods or other natural disasters not only in the local level, but at the national level as well. During interviews with successful *chira* mill owners it became evident that most NGO executives are unfamiliar with recent changes in *chira* production.

Kazipur Upazila, Sirajganj District: Dry Food *Chira*



* The numerical values in parentheses next to key issues correlates to 'constraints due to vulnerability' in the following section of the study. The numbers represent the specific constraint.

7.6 Constraints due to Vulnerabilities, Market Based Solutions, and Potential Facilitation Activities

A number of constraints due to vulnerabilities were identified in the chira value chain. For each constraint, the team developed potential market-based solutions to the constraint and potential facilitation activities that development organizations may use to support market actors to develop and implement these market-based solutions. Constraints, market-based solutions, and potential facilitation activities can be found in the table below.

	CONSTRAINT DUE TO VULNERABILITY	MARKET BASED SOLUTION	POTENTIAL FACILITATION ACTIVITIES
1	Misinformation and weak linkages between NGOs and *chira* suppliers have resulted in NGOs being unaware of the increased capacity of *chira* mills from 2004-2012. Therefore NGOs tend to source *chira* from Bogra and Naogaon and not from local *chira* mills as they have the misconception that local mills do not have sufficient supply. This results in market distortion, higher costs to NGOs, and loss of potential business for local Sirajganj and surrounding area mills.	Access to information for NGO staff about the availability of local *chira* suppliers	Support *chira* processors to contact local NGOs and/or establish relationships with NGO procurement people (may conduct local "DRR fairs" for NGOs and suppliers to meet)
2	Load shedding (power outs) regulated by the government restrict production capabilities for *chira* mills and limit the amount of *chira* available during disasters. As a result minimal amounts of *chira* are available on the market for those most affected by the floods, which require dry food for short term relief.	Access to additional electricity connections for "critical" businesses	Support *chira* producers to lobby local government administration for designation as a "critical" business to enable them to access a second electricity connection
3	During the initial stages of flooding, demand for *chira* spikes as does the price which results in increased economic pressure for the most vulnerable.	Access to information for NGOs about *chira* producers and improve their ability to source from these producers	Support NGOs to develop systems to "pre-qualify" local suppliers and establish forward contracts for emergency supplies
4	Local mills have less scope to develop a stock of *chira* due to poor storage facilities and currently can store *chira* for a limited time of up to a single month. As a	Access to improved storage/inventory management	Support *chira* producers to develop improved storage facilities and to improve their ability to manage

	result, mills have lower quantities of *chira* on stock and therefore when severe flooding occurs and the distribution of *chira* is required, relief organizations are unable to source large quantities of *chira* from local mills.		inventory, particularly in times of severe flooding Support *chira* producers to store *chira* with the rice bran to improve shelf life on a commercial scale

A set of potential facilitation activities aiming to reduce vulnerability in the *chira* value chain include supporting:

- *chira* processors to contact local NGOs and/or establish relationships with NGO procurement people (may conduct local "DRR fairs" for NGOs and suppliers to meet)
- *chira* producers to lobby local government administration for designation as a "critical" business to enable them to access a second electricity connection
- NGOs to develop systems to "pre-qualify" local suppliers and establish forward contracts for emergency supplies
- *chira* producers to develop improved storage facilities and to improve their ability to manage inventory, particularly in times of severe flooding
- *chira* producers to store *chira* with the rice bran to improve shelf life on a commercial scale

7.7 Implications for Relief and Recovery Efforts

Given the importance of *chira* in the early stages of disaster relief, humanitarian responders should have a list of pre-qualified local suppliers so that they are immediately able to source and distribute *chira*.

8. TUBE WELLS

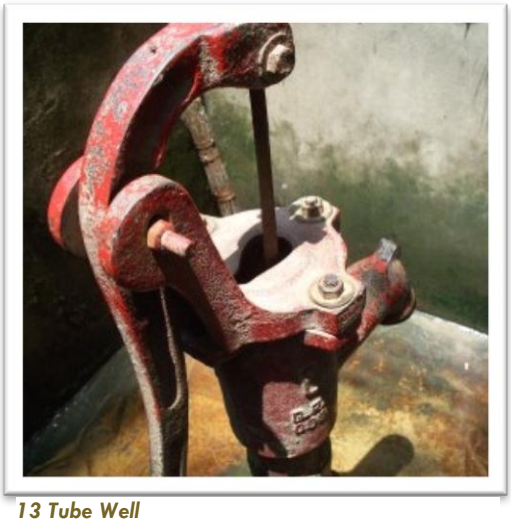
8.1 Rationale for selection of Tube Wells

As a result of water logging, river water inundates homestead tube wells during flooding resulting in the inaccessibility to clean drinking water for the overwhelming majority of Kazipur inhabitants. Because clean drinking water is essential to life, an analysis of the tube well value chain is fundamental for future recovery activities. It is likely that local tube well market actors have the capacity to play significant roles to minimize health hazard risks during flood disasters and to expand current markets.

8.2 End Markets and Competitiveness

Nearly every homestead in Kazipur has access to a tube well, making potable water available in the region, thereby increasing quality of life for Kazipur inhabitants for the majority of the year. A tube well is a water well consisting of a long pipe bored into the ground and sunk to the depth of the water table. A hand pump is utilized to draw water up from the well to the surface. If the well is sunk into an appropriate location, it has the capacity to provide clean water for drinking, cooking and cleaning purposes.

Tube wells are particularly popular in Kazipur due to their affordability and ease of installation, therefore making the tube well market viable and successful. A considerable number of tube wells have been installed in Kazipur by the government and NGOs; however, the vast majority of tube wells are purchased from the local market by end market users for individual homestead utility. Consumers typically purchase tube well materials from retailers who source materials from Bogra, namely, iron piping, filter piping, a head, and adjuster from a tube well input supplier, who then recommends a local service provider capable of installing the tube well in their home. The typical tube well installation process requires three technicians, and generally requires four hours for drilling and installation. In general, the head of the tube well stands nearly 50cm off of ground level, and potable drinking water is found at water table levels that are 55-60ft deep.



13 Tube Well

There is steady demand for tube well materials and installation services and therefore ample supply for materials and services are located in both Sirajganj town as well as *char haats*. In Sirajganj town, the 20 installers available are sufficient to meet local areas demand for tube well installation. Pricing of tube wells is variable and contingent on the depth of the water table and location of the homestead. Costs increase for tube well installation of particularly deep water tables, which require additional piping. For instance, installations for homesteads located on the edge of the river are more costly as suitable water table levels are only

available at deeper levels. Similarly, remote homesteads require additional travel time and transportation costs thus increasing cost. Therefore, materials can range in price from 3,000 to 10,000Tk and installation costs can range in price from 500-1,000Tk. Prices tend to be slightly higher in the *chars* as iron levels are elevated and require greater depth to access iron free levels of drinking water.

Prior to the awareness and popularity of accessing clean drinking water from tube wells, Kazipur inhabitants used to source their drinking water from the river which is highly risky for personal health. Therefore, tube wells serve as a superior method of sourcing clean drinking water. However, there are some potential drawbacks to the design, including the risks of water contamination, specifically during times of flooding.

14 Tube Well Inundated with Flood Water

8.3 Repercussion from Floods

Post flooding, safe drinking water is available at flood shelters and therefore available to a small minority of Kazipur's population who seek shelter during flooding. The overwhelming majority of people seek shelter on high embankments rather than in shelters, as there is little space available in shelters. Therefore, generally, clean drinking water is unavailable to the vast majority of those remaining in their homesteads. Most inhabitants did not consider flood levels when they had their tube wells installed in their homesteads, and therefore, flood waters make tube wells inaccessible and may leak into the tube well, contaminating the well and making people vulnerable to waterborne diseases.

A typical tube well stands 20 inches off the ground and each year for 10-15 days in various areas during the Kazipur floods, water levels surpass tube wells thereby making safe drinking water unavailable and in short supply for a specific duration of time. In 2012, flooding caused water levels to rise 24-35 inches from the ground level, and therefore many Kazipur inhabitants were unable to utilize their tube wells. Kazipur inhabitants cope during this time period by collecting drinking water from neighboring communities' tube wells, or by resorting to drinking river water. Vulnerable inhabitants use banana boats to travel to neighboring *chars* and gather clean drinking water in jugs and return to their homesteads. When this means of water collection is implausible, inhabitants resort to collecting drinking water from the river which is polluted. Alternative clean drinking water options that have been distributed during flooding by relief agencies such as bottled water or purification tablets are unsustainable and unpopular among *char* inhabitants. Bottled water is costly for minimal quantities of water and therefore unaffordable to those affected by the floods, and the taste ensuing from purification tablets is intolerable for inhabitants and therefore disregarded.

15 Char Dweller Pointing to Typical Height of Flood Level

In an attempt to dissuade *char* inhabitants from drinking contaminated river water during flooding, solutions to raise tube wells have been implemented by the government, NGOs and tube well market actors to ensure the availability of clean drinking water all year round. However, there are varying methodologies used to raise tube wells. A non-commercially viable option typically more mainstream and employed by the

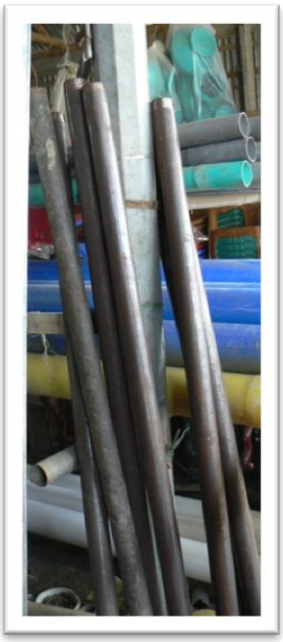
16 Raised Platform Tube Well

government and NGOs, and a commercially viable option that is uncommon yet implemented by commercial tube well installers. The non-commercially viable option is typically an initiative executed by the government, as well as local and international NGOs. It entails elevating a tube well four to five feet above ground level, at a depth of 70ft, and a cost of 40,000Tk per tube well, which is unaffordable for households as a typical tube well costs 5,000-6,000Tk. The raised tube well rests on a platform, including stairs, and is constructed with bricks, sand, cement, and steel. These tube wells are designed to be three feet above the height of the highest flood level previously recorded, and are intended to source water for 20-60 families during flooding. However, our findings suggest that such tube wells were often neglected, required maintenance, and were not utilized, particularly during the non-monsoon season. Additionally, the selected sites for the elevated tube wells were not serving the most vulnerable communities. For instance, one such community that had at least three elevated tube wells in close proximity did not have a strong need for the wells as they had alternative viable options for clean drinking water, typically sourcing clean drinking water from their neighbors' tube well, who had raised homesteads, and therefore their tube wells were unaffected by flooding.

Our findings did suggest, however, that adjacent *chars* in remote areas, whose inhabitants are more vulnerable to flooding as they reside on lower lands, were not beneficiaries of the raised tube well initiatives made by NGOs and the government. When interviewing members of these communities it was suggested from one Chairman of the Union, that an alternate commercially viable solution exists to raise tube wells for an additional cost. Local tube well retailers and installers validated this information stating that a tube well can be raised at a relatively low cost of 360Tk by adding an iron pipe and joint to raise the height of the tube well by three feet. This would be utilized as a temporary measure during the flood period for 20 days, and then disassembled post flooding to ensure access to ample water pressure. Tube well technicians recommend tube wells be elevated by three feet, and state that the installation can be performed by tube well owners, as the process is relatively quick and easy and requires at most 30 minutes. Costs, while substantial for poorer inhabitants, are still affordable with iron piping costing 100Tk per foot plus 60Tk for the joint and inhabitants will reap the benefits of the additional piping for 7-10 years. Technicians and Public Health Engineers reiterated the technical

17 Raised Platform Tube Well (Non-Commercially Viable Option)

18 Chairman of the Union



20 Iron Extension Piping for Tube Wells

feasibility of raising tube wells on *chars* by five feet from the ground, but not higher due to feeble pressure levels.

This initiative was originally piloted by the Public Health Engineering Department and their findings suggest that while the solution is technically feasible, it remained unpopular among inhabitants mainly due to a lack of awareness. Similarly, retailers and installers suggest that "very few" purchase additional piping for the purpose of elevating tube wells during flooding, and also suggest that local "*mistris*" (technicians) are best suited to train consumers on this probable solution, and on how to install the additional pipe and socket. They believe that this solution will only become popular and gain support at the community level when the concept is spread by word of mouth, and others in the community begin to utilize the mechanism. Until then, community members will resist because they "have never heard or seen" this solution implemented. Even more so, because flooding is only temporary and lasts for only 20 days, therefore, community members prefer to save money, and not invest in expensive coping methods, especially because they are particularly vulnerable at that time of year, as flooding destroys their entire livelihood. They mentioned that they would rather maintain temporary coping mechanisms until their tube wells become accessible again.

8.4 Value Chain Map and Description of Market Actors

During the analysis of the tube well value chain more than six interviews were conducted with market actors and key informants at district headquarters and remote *char* areas. The primary actors in the tube well value chain include the following:

- Wholesalers
- Retailers

As seen in the following value chain map, several market actors may take on a number of different functions.

8.4.1 Wholesalers

The wholesalers are large scale traders who collect tube well parts from agents of the company, or directly from the manufacturers. Generally, they purchase bulk volumes and are used to sell directly to the users, as well as to other retailers. Wholesalers sell CGI sheets and other iron products to the same shops.

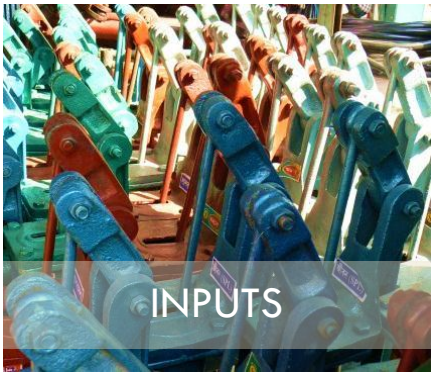
8.4.2 Retailers

There are 12-15 retail shops for tube wells in Natuapara *haat* and another 15-18 retail shops in the Kazipur sub-district. They collect generally three to six sets of tube well from local wholesalers or from distant wholesalers. In Natuapara, some *haat* retailers also collect from Bogra town and use local transport to carry the materials. Retailers have good linkages with tube well installers, and assist buyers in selecting good installers.

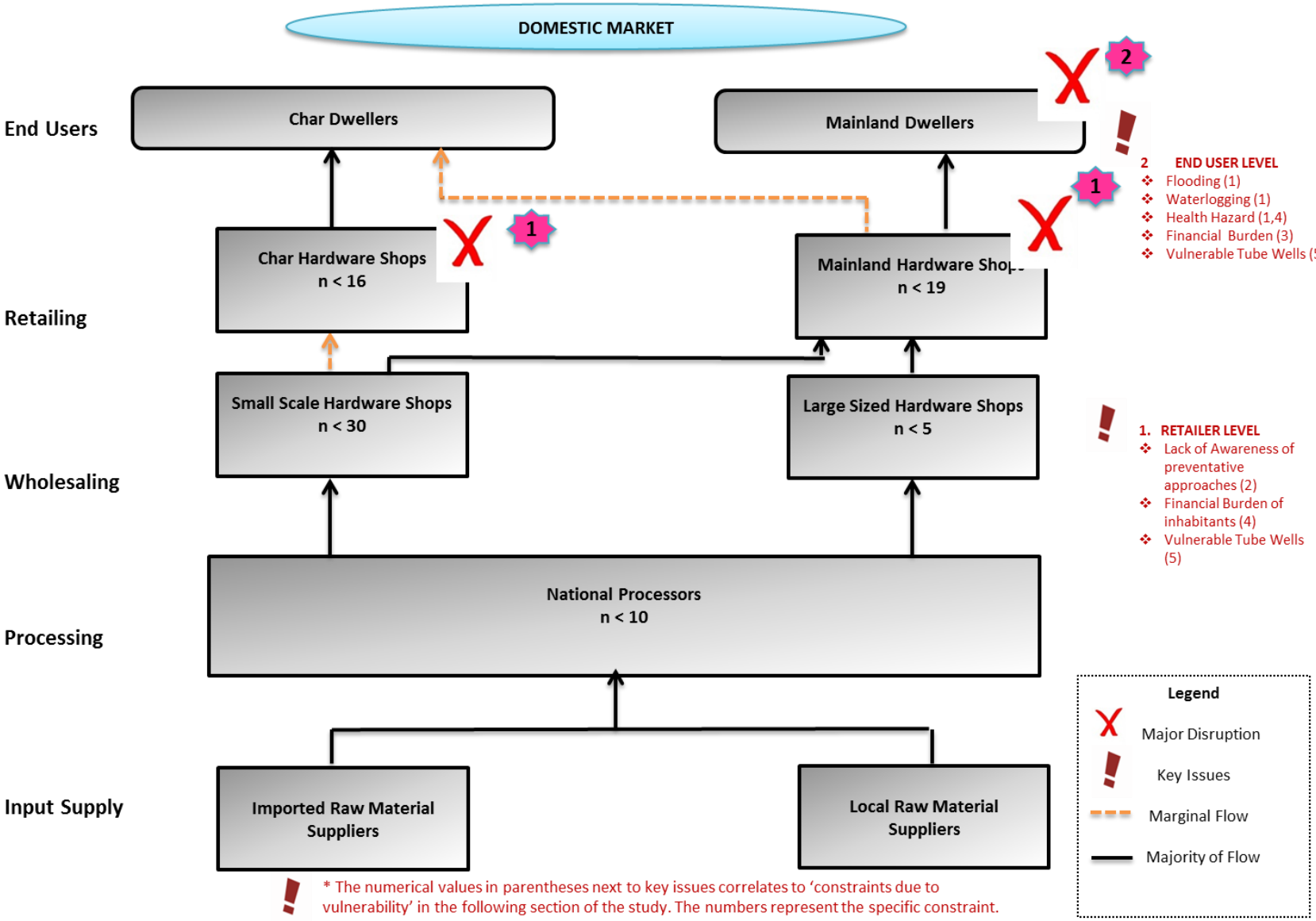
8.4.3 Supporting market actors

Supporting market actors include both private and public-sector entities that are not exclusively tied to the tube well value chain. Mostly rural *char* and mainland people own tube wells themselves, but there is some support from the Government Public Health Engineering Department (DPHE) as well as non-government

development projects for the installation of tube wells in the *char* areas. Mostly, these departments extend minimal services to remote areas during floods and during post flood rehabilitation to ensure safe drinking water. Financing for the tube well owners is heavily dominated by their own resources and/or from microfinance organizations. There are installation workers, or *mistris,* who provide technical services for installation and need-based repairing services.



Kazipur Upazila, Sirajganj District: Tube Wells



8.5 Constraints due to Vulnerabilities, Market Based Solutions, and Potential Facilitation Activities

A number of constraints due to vulnerabilities were identified in the tube well value chain. For each constraint, the team developed potential market-based solutions to the constraint and potential facilitation activities that development organizations may use to support market actors to develop and implement these market-based solutions. Constraints, market-based solutions, and potential facilitation activities can be found in the table below.

	CONSTRAINT DUE TO VULNEABILITY	MARKET BASED SOLUTION	POTENTIAL FACILITATION ACTIVITES
1	During flooding, for a period of 15-20 days, water levels surpass tube wells, due to the design of tube wells thereby making safe drinking water from tube wells unavailable and contaminated for Kazipur inhabitants.	Access to low-cost means of raising tube wells above flood level	Support tube well installers and traders to sell low-cost means of raising tube wells on a temporary basis
2	Technically feasible and affordable ways to elevate tube wells during flooding, such as adding an extension pipe and socket, exist however remain unpopular among inhabitants mainly due to a lack of awareness, resulting in flood water inundation, and unsafe drinking water for Kazipur inhabitants.	Access to information about low-cost means of raising tube wells above flood level	Support tube well installers and traders to teach customers/households low-cost means of raising tube wells on a temporary basis Support tube well installers and traders to teach regulators and other actors (NGOs, Union *Parishad*, etc.) about low-cost means of raising tube wells on a temporary basis
3	Installations of tube wells for homesteads located on the edge of the river are costly, and therefore an additional financial burden for those residing in vulnerable areas, as suitable water table levels are	See #1 & #2 above	See #1 & #2 above

	located deeper into the ground due to erosion.		
4	Since flooding is only temporary, lasting for a maximum of 20 days, and destroys households' entire livelihood, rather than invest in expensive alternative ways to attain clean drinking water, community members prefer to save money, and resort to drinking unsafe river water, and are therefore at risk of waterborne diseases.	See #1 & #2 above	See #1 & #2 above
5	*Char* dwellers and tube well suppliers do not consider flood levels during initial installation of tube wells, and therefore tube wells are installed in a way which makes them highly vulnerable to flooding, resulting in a lack of safe drinking water for *char* dwellers.	See #1 & #2 above	See #1 & #2 above

A set of potential facilitation activities aiming to reduce vulnerability in the tube well value chain include supporting:

- tube well installers and traders to sell low-cost means of raising tube wells on a temporary basis
- tube well installers and traders to teach customers/households low-cost means of raising tube wells on a temporary basis
- tube well installers and traders to teach regulators and other actors (NGOs, Union *Parishad*, etc.) about low-cost means of raising tube wells on a temporary basis

8.7 Implications for Relief and Recovery Efforts

Due to the critical role of safe drinking water in maintaining health, relief agencies can promote the use of short lengths of pipe and joints to raise tube wells by households, particularly during slow onset flooding.

9. CONCLUSION

Action for Enterprise's findings determine that there is significant need to apply market-oriented approaches to DRR programs in Kazipur. These approaches have the potential to generate a number of improvements over traditional DRR and relief approaches currently being implemented. Utilizing these approaches will undoubtedly generate additional benefits for the poor including increased sustainability of economic gains, reduced vulnerability from natural hazards such as cyclones and floods, and improved targeting of relief efforts in the event of disasters. As determined by the various market-based DRR solutions, the implementation of 'potential facilitation activities' will address the specific constraints of market actors specific to Kazipur and enhance existing relief and rehabilitation efforts. Furthermore, the results of these and similar value chain analyses can play an important role in helping relief and early recovery efforts to strengthen the market systems in which the 'most vulnerable' operate.