

# Mapping the onion value chain of Dhaka, Bangladesh

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C. Terwisscha van Scheltinga



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Wageningen Environmental Research  
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Onion is the most commonly used spice in Bangladesh, and the most market sensitive agricultural-commodity, well-known for its huge price volatility. In recent years, the country has faced a steep increase in the price of onions, which made the commodity unaffordable for poor- and low middle-income people. Wageningen Research (WUR) and the Food and Agriculture Organization of the United Nations (FAO) conducted an onion value chain mapping study to identify and understand the flow of the product from producer to the consumer in Dhaka, the role of the value chain actors, their relationships, the leverage points, and the constraints.

Keywords: Onion, Value chain mapping, Value chain, Bangladesh, Dhaka

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# Verification

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# Summary

Onions are the most commonly used spice in Bangladesh and the most market-sensitive agricultural-commodity. They are well-known for their huge price volatility. In recent years, the country has faced a steep increase in the price of onions, which made the commodity unaffordable for the poor and low middle-income citizens of Bangladesh's capital, Dhaka.

As a first step towards development of a strategic action agenda on the onion supply chain for the four city corporations in Dhaka, Bangladesh, Wageningen Research (WUR) and the Food and Agriculture Organization of the United Nations (FAO) conducted an onion value chain analysis (see report of Kok, Soethoudt, & Vernooij, 2021). Part of the onion value chain analysis was a participatory mapping workshop held in Dhaka, in January 2020, from which this report has been derived. Spatially mapping the onion value chain shows *where* onions come from, the path they follow to reach the consumer, and where the leverage points and constraints of the onion value chain occur.

During the onion value chain mapping workshop, 14 participants of all the stages of the onion value chain were invited to share their knowledge and experience of the onion value chain in Bangladesh. Participants from the following stakeholder groups were invited: farmers, aggregators, importers, wholesalers, retailers, and the Department of Agricultural Extension (DAE), part of Bangladesh's Ministry of Agriculture. The workshop took place in multiple rounds, during which the participants first discussed the actors and activities in the onion value chain, followed by the issues that the actors face with regards to the onion value chain.

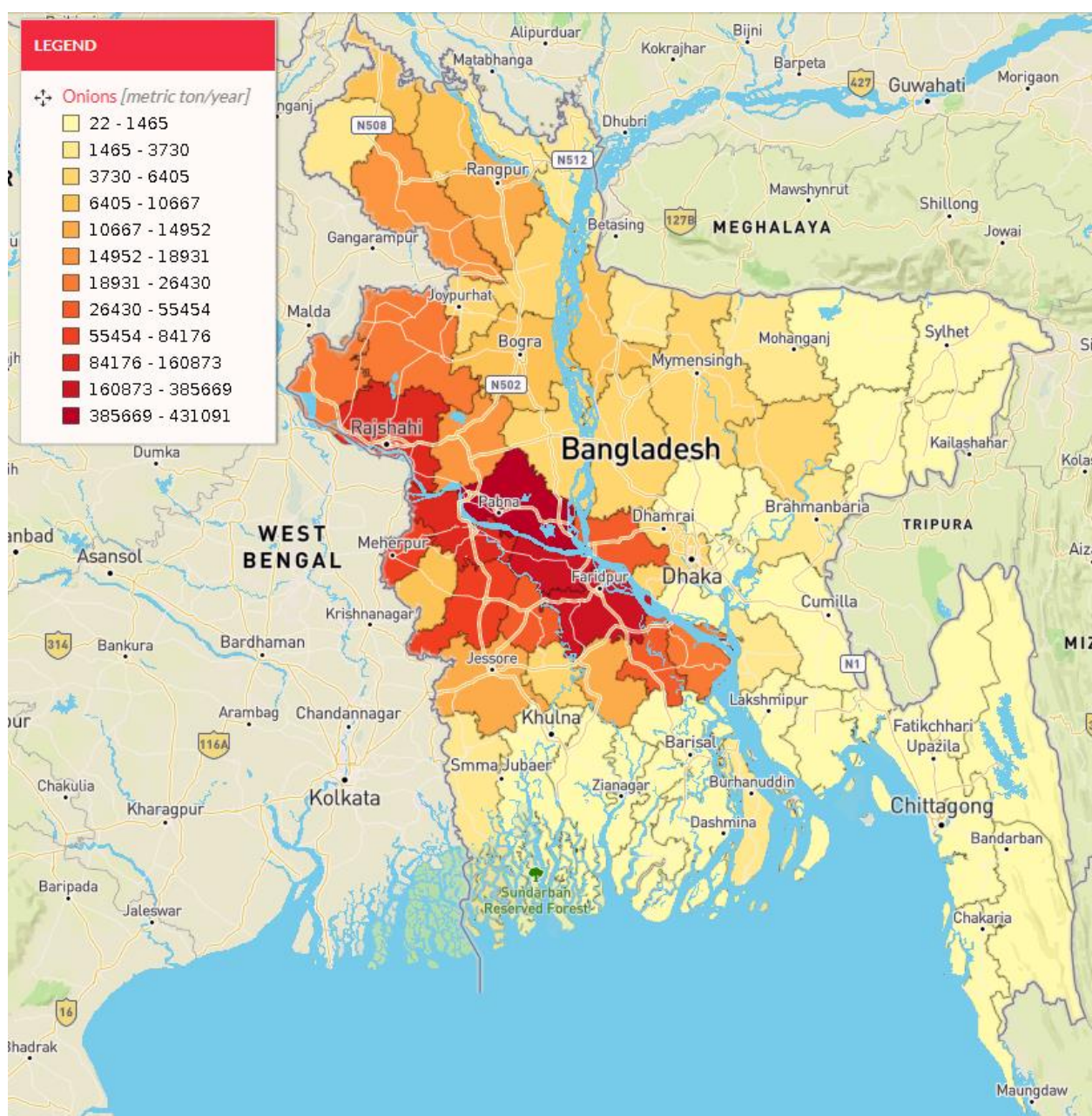
The major issues identified by the onion value chain mapping workshop participants were a fragmented supply chain, restrictive access to (scientific) knowledge (e.g. the range or amount of fertilizer to use) and technology (i.e. machinery and a forecasting system for demand and supply of onions) for onion cultivation and trade, lack of adequate storage, and the dominance of a few traders in the chain. These are serious challenges that need to be overcome to build a sustainable onion value chain.



# 1 Introduction

Bangladesh is a predominately agricultural country. In 2019, 38% of the population was employed in the agricultural sector (International Labour Organization, 2021). The agricultural sector accounted for 13.31% of Bangladesh Gross Domestic Product (GDP) in 2018 (Bangladesh Bureau of Statistics, 2019). Agricultural production is under pressure due to a growing population and urbanization. In the capital city of Dhaka, the majority of citizens rely on food purchases for food consumption. As a result, food produced in rural Bangladesh needs to be delivered to Dhaka daily to meet the demand for food.

The primary spice crop used and produced in Bangladesh is the onion. Onions are produced all over Bangladesh (see Figure 1), but the majority of cultivation takes place in the western provinces.



**Figure 1** Distribution of onion production in Bangladesh (Wageningen University and Research, n.d.).

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In 2018, 1,738,000 tonnes of onions were produced (Bangladesh Bureau of Statistics, 2019), utilizing approximately two percent of the total agricultural land (Nasim et al., 2018). Enough onions were cultivated to fulfil the 11.8 kg/year/per capita consumption level<sup>1</sup>. Yet, Bangladesh also imported 1,091,000 tonnes of onions in 2018 (Bangladesh Bureau of Statistics, 2019). The necessity to import onions is a recurrent problem, despite efforts by the Government of Bangladesh in offering subsidies and agricultural input support to farmers for seeds, fertilizers, irrigation, and pesticides (Bangladesh Bureau of Statistics, 2015). Additionally, Bangladesh also struggles with onion price fluctuations due to seasonal variations. Understanding the challenges of the onion value chain and providing solutions is difficult, as they are part of a food system that can be described as follows:

*"Interdependent networks of stakeholders (companies, financial institutions, public- and private organizations, and individuals) in one or various geographical areas (region, state, multinational region) that participate, directly or indirectly, in the creation of flows of goods and services geared toward satisfying the food needs of one or more groups of consumers in the same geographical area or elsewhere."* (Rastoin and Gherzi (2010) in Jacobi et al. 2019).

Through the food system, the steps and actors within the value chain are interconnected and the relationships between the stakeholders are complex. Therefore, an overall understanding of the onion value chain, including its bottlenecks, is crucial to successfully identify solutions. The relationships between stakeholders, identification, and location of challenges and effective policies and targeted interventions can contribute to greater efficiency and sustainability can be achieved through the participatory mapping method.

## 1.1 Goal

This report contributes to the onion value chain analysis of Kok, Soethoudt, & Vernooij (2021). Their onion value chain analysis was a first step towards developing a strategic action agenda on the supply chain for the four city corporations in Dhaka. The analysis aims to decrease food loss and waste by five percent, and increase food availability (Kok, Soethoudt, & Vernooij, 2021).

As part of the onion value chain analysis, the Food and Agriculture Organization of the United Nations (FAO) in Bangladesh, and Wageningen University and Research (WUR), organized a participatory onion value chain mapping workshop on 28th January 2020. The workshop applied:

*"a participatory value chain mapping approach to initiate a dialogue between the different actors involved and to validate the information provided by the different actors."*  
(Kok, Soethoudt, & Vernooij, 2021, p. 11)

The goal of the workshop was to let onion value chain actors spatially map where onions come from, and the path the onions follow to reach the consumer in Dhaka. In addition, the participants were asked to identify the actors and their roles in the value chain, along with the major challenges and location of those challenges, regarding inputs, quality of the produce available, food losses, distribution, and relations.

This workshop report provides an overview of the onion value chain spatial mapping workshop, including the role of various actors associated with the cultivation, sale and import of onions, and the power relationships between relevant actors. The report outlines the major challenges and potential solutions within the onion value chain according to the onion value chain mapping workshop participants.

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<sup>1</sup> FAO, <http://www.fao.org/faostat/en/#data>

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## 1.2 Objectives

The overall objective of the participatory workshop was to create dialogue on the identification of bottlenecks and leverage points in the onion supply chain.

The specific objectives were:

1. To develop a flow chart map that identifies the actors (and their roles), as well as linkages between stages of the food chain, from production to consumption.
2. To locate weaknesses and constraints in the existing value chain.

## 2 Methodology

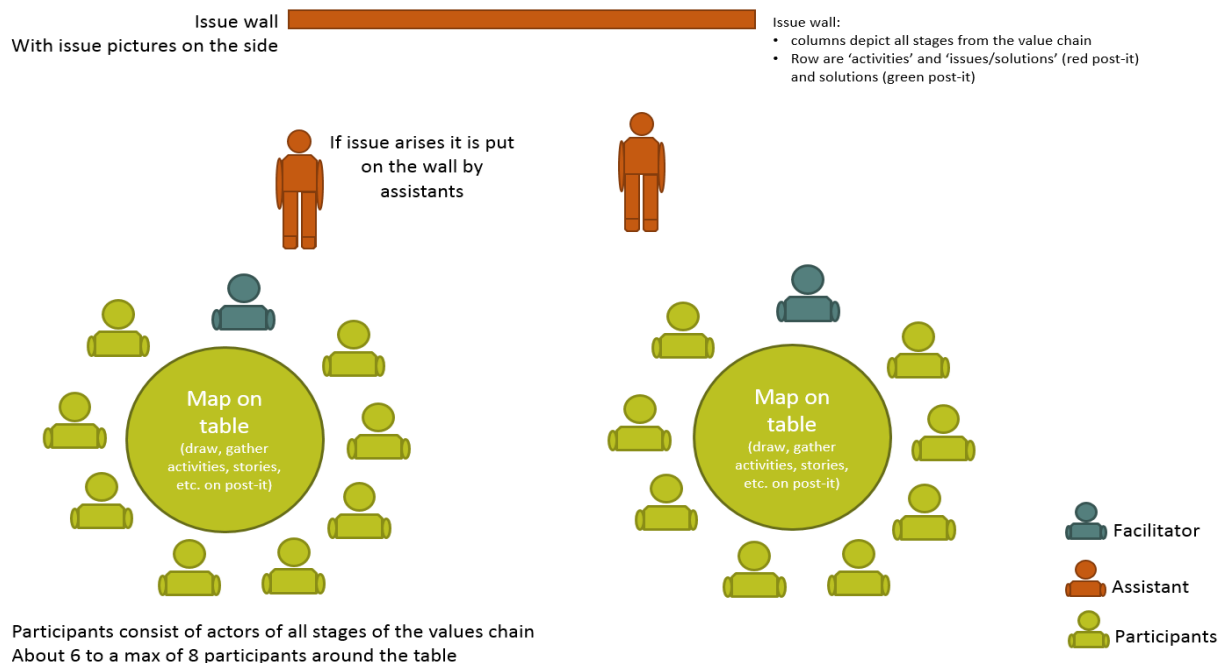
### 2.1 Approach and workshop set-up

A participatory onion value chain mapping workshop was conducted to create a dialogue between different stakeholder groups to identify the value chain actors (*who*), the stages of the value chain, including the opportunities and issues (*what*), and where those actors, activities, opportunities, and issues occurred spatially in the onion value chain (*where*). The stakeholders are interconnected, thereby, the activities of each stakeholder have far-reaching impacts on other actors, as well as the overall value chain. A participatory approach to onion value chain mapping was used, due to the complex nature of interactions between stakeholders. The approach initiated a dialogue between the different stakeholders to reflect and discuss the main features of the onion value chain, the problems stakeholders face, and the potential solutions available (Jacobi et al., 2019).

The spatial map developed in the workshop formed an important first step in a value chain analysis, because the map shows where onions come from and the path that they follow to reach the consumer. The issues in the onion value chain were depicted at the places where they occurred through sticky notes with issue descriptions. Furthermore, the onion value chain issues were validated by several different actors. The participatory value chain mapping workshop formed the starting point for a more in-depth investigation of the onion value chain.

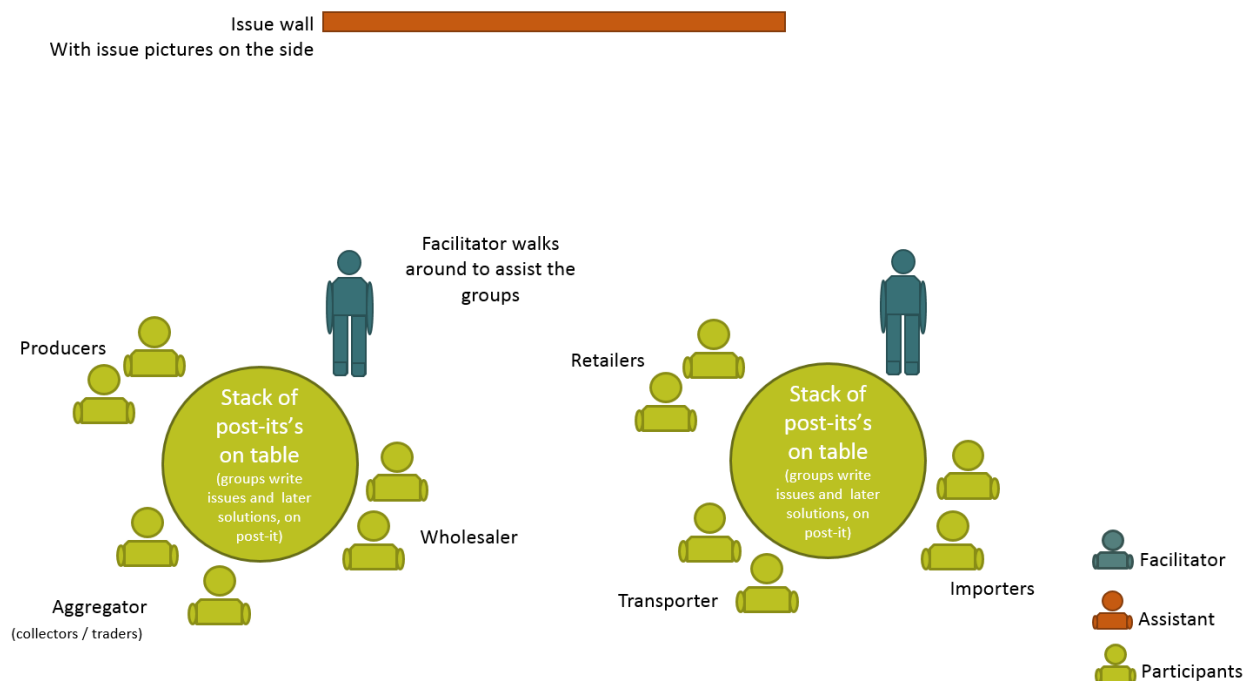
The workshop was arranged in three rounds (see Annex 1 for the workshop agenda):

1. **Introductory session:** All guests, facilitators and participants were introduced to each other. After initial introductions, the group was split into two and both subgroups were provided with information on the workshop proceedings. The participants filled in a survey on the background information of their operations (see Annex 2). Figure 2 shows the set-up of the first phase.



**Figure 2** Stylised representation of Phase 1 of the workshop.

2. **Value Chain mapping:** In the second phase of the workshop (see Figure 3), the lead facilitator briefly described the meaning of value chain mapping through a PowerPoint presentation. After the presentation, the group was split into two, both subgroups contained a lead and assistant facilitator, and at least one member of every stakeholder group. The groups were instructed to trace their value chain with their roles, inputs and outputs, the onion transport route, and the methods of transports by using two geographical maps: One of Bangladesh with defined boundaries of districts and subdistricts, and another one of Dhaka city with defined ward perimeters.



**Figure 3** Stylised representation of Phase 2 of the workshop.

3. **Issue identification session:** Based on the mapped onion value chain from the previous workshop round, the issues present in each stage and per stakeholder of the onion value chain were identified in the third phase of the workshop.

After Phase 2, the groups presented their value chain maps and issues to the other participants and the findings were validated. Figure 4 gives an impression of the interactions during the workshop.

## 2.2 Participants

The following actor groups were invited to the workshop; farmers, aggregators, importers, wholesalers, retailers and from Bangladesh's Ministry of Agriculture, the Department of Agricultural Extension (DAE). The farmers and aggregators were selected in consultation with the DAE. The importers, wholesalers and retailers were selected in consultation with the Department of Agriculture Marketing (DAM), a department of the Ministry of Agriculture. In total, 14 participants contributed to the onion value chain workshop. A minimum of two participants from each stakeholder group participated in the workshop.





**Figure 4** Impressions of the onion value chain workshop.

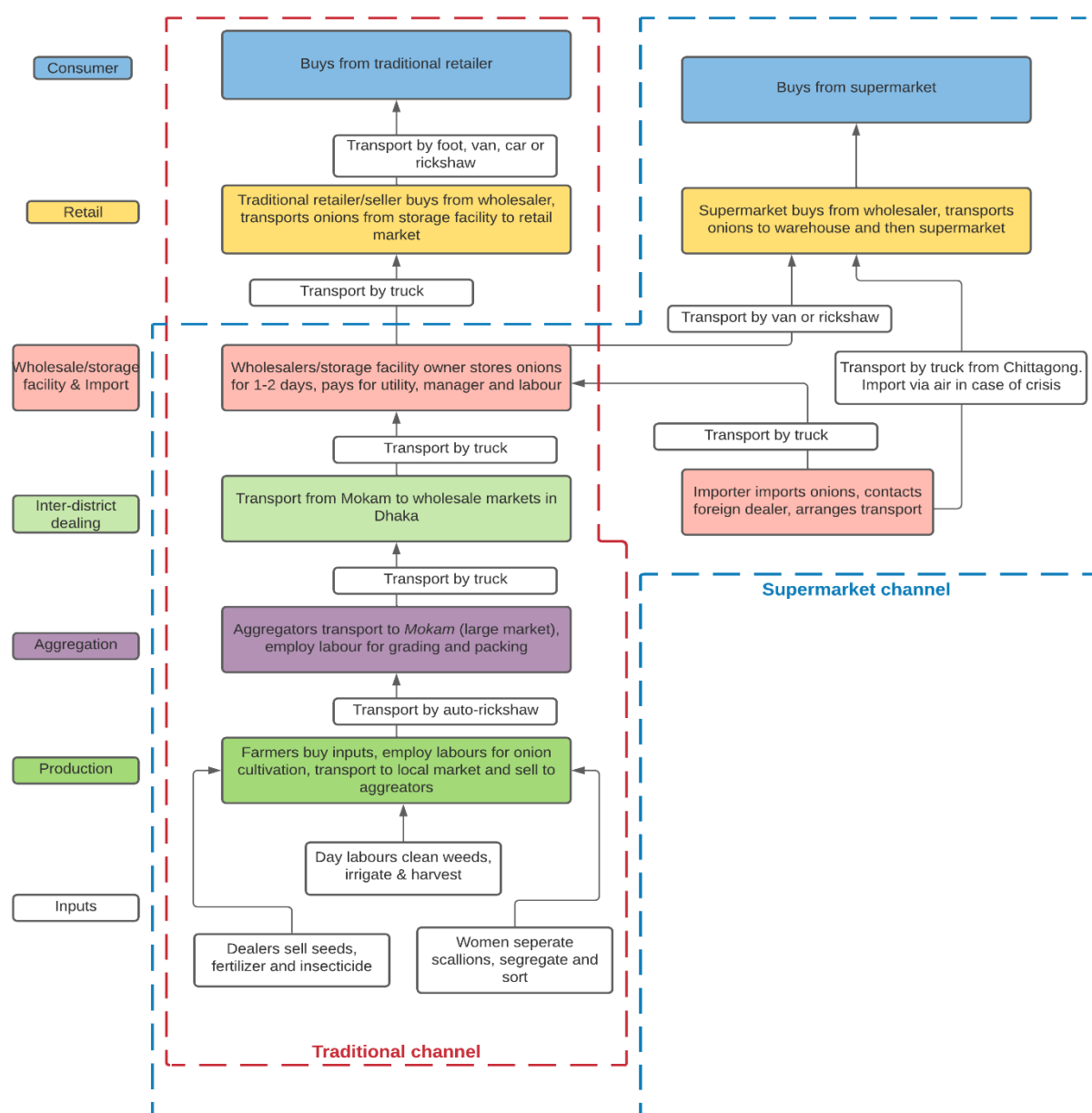


# 3 Results

This Chapter describes the stages, actors and issues identified in the onion value chain. The results only reflected the views of the workshop participants. The results presented here are a combination of the stages, actors and issues identified by the two different participant groups.

## 3.1 Stages identified in the onion value chain

The workshop participants identified the different stages in the onion value chain, from cultivation to consumption. In Figure 5, all identified stages are briefly described, a more elaborate description can be found in the following text. All stages within the red-dotted area are part of the traditional channel of the onion value chain, while all stages within the blue-dotted area are part of the commercial channel. The spatial onion flow diagrams can be found in Annex 3.



**Figure 5** Onion value chain map.

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### 3.1.1 Production

The onion grows in the rabi season, which runs from November to April, and is, therefore, also referred to as rabi crop. One production cycle takes about six months from October-November to March-April. Two different onion production cycles occur in Bangladesh. In the first cycle, onions are produced from seed and harvested in March or April. In the second cycle, *murikata* onions are bulb grown in the late monsoon season (*kharif*), and harvested in February. Farmers buy seeds, fertilizer, pesticides, and insecticides from dealers. Land labourers are hired for irrigation, removal of weeds and harvesting.

After harvesting, farmers utilise female labour to cut the extra part of the onion plant from the onion. The extra part is treated as waste because it has a bad odour and no use. A lack of storage facilities leads to direct selling of 70% of the harvest. The onions are either sold to a local small/large trader, in the local market (*haat*), or from the farm gate. To earn more money, farmers harvest unripe rabi onions when the market demand is high. Unfortunately, their poor-quality results in a lower price for farmers. A part of the harvest spoils because the onions are of bad quality. The remaining 30% harvest is stored in the farmer's house, through the creation of a ceiling in the house. In the whole stage of production, approximately 20% of loss is incurred due to spoilage and money restraints.

### 3.1.2 Aggregation and local storage

Aggregation and local storage takes place in the local market. Local small and large traders store onions for around ten to 12 hours. Traders purchase onions in 40 kg packages from farmers. Then, after sorting and grading the onions, the onions are repackaged into 80 kg plastic bags. In this stage, five percent of loss occurs. The local stock keeper influences the onion purchasing price. There is no impact of seasonality on the trader's operations, and the onions are sold to the wholesaler by involving the storage owner on commission basis. For the aggregation and local storage stage local stock keepers were identified. They preserve onions for future sales to achieve more profit in off-peak season. The local stock keepers were not represented in the workshop and their role needs to be understood in further detail.

### 3.1.3 Wholesale and temporary storage

Wholesale and temporary storage takes place in Dhaka and is located at a wholesale market. The major wholesale markets in Dhaka are *Shyambazar* (old Dhaka), *Karwan Bazar* (central Dhaka) and *Mohammadpur* (West Dhaka). Sometimes, inter-district dealers act as transporters, they purchase onions from aggregators and transport them to storage facilities in Dhaka city by truck.

Storage owners sell onions to the wholesaler on commission. They are sold quickly and only stored for a maximum of three to four days in cases of demand shortage. *Murikata* onions are sold as fast as possible, because their high moisture content can decrease quality.

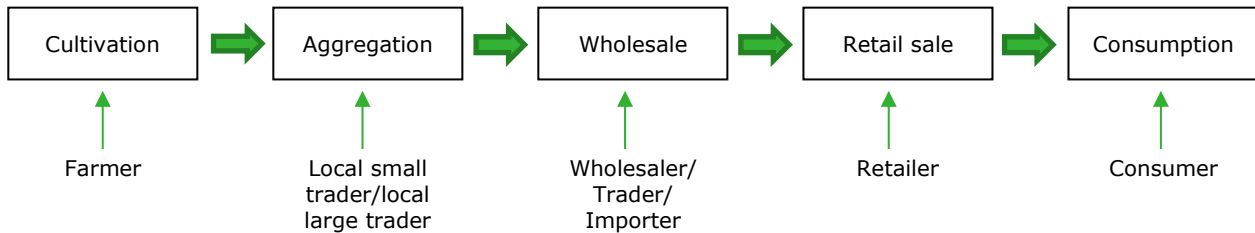
Importers usually act as a wholesaler, but occasionally as a storage owner as well. Onions are mainly imported from India. However, in 2019, when India banned onion export, onions were imported by air from other countries due to high domestic demand. Importers face onion losses, as the products take a long time to transport over the border.

### 3.1.4 Retail sale

The different kinds of retailers usually buy onions from wholesale markets close to their shops' location. Commercial retailers buy in bulk and incur some losses due to this. Retailers store onions for a maximum of three days. Small grocery store retailers and retailers with a fixed or mobile stall are not impacted by seasonality or storage. Retailers transport onions to wet markets by rickshaw and van.

## 3.2 Actors identified in the onion value chain

Active actors in the value chain were identified simultaneously with the identification of the stages of the onion value chain by the workshop participants. Figure 6 gives a brief overview of the different phases in the onion value chain and which actors are involved in every stage. A more detailed explanation of every actor's role and phase follows below.



**Figure 6** Stages and actors involved in the onion value chain.

**Farmers:** Farmers are responsible for the onion cultivation. There are five types of farmers that can be distinguished according to their relation to the land that they use for onion cultivation. The biggest group are the farmers with their own land (76.57%), followed by farmers who lease land (9.28%), farmers with a mortgaged tenureship (7.48%), sharecropping tenureship (6.31%), and 0.36% of farmers have another ownership construction (Bangladesh Bureau of Statistics, 2015).

**Local small trader (Faria):** These are the itinerant traders who procure onions from farmers and sell the onions to the beparis at the local village markets.

**Local large trader (Bepari):** These are also itinerant traders who trade long-distance. Beparis collect onions from framers and farias. Afterwards, the bepari sort, grade and bulk the onions. The onions are sold to an aratdar. Most of the time, local large- and small traders undertake the same activities.

**Storage owner (Aratdar):** A broker or commission agent who operates from fixed premises, and who links beparis with buyers (i.e. other beparis, millers or processors, wholesalers/paikars or even retailers). While the pure function of the storage owner is that of a commission-based broker, the aratdar is also known to sometimes combine brokerage with direct trading in Dhaka.

**Importers:** Import onions from India, China, Pakistan, and Egypt. Importers also act as wholesalers sometimes. They are mainly located in Dhaka and Chittagong. Imported onions are sold to wholesalers or retailers.

**Wholesalers (Paikar):** A wholesale buyer in Dhaka who purchases directly from a storage owner, or uses a large, local trader to buy on their behalf. Wholesalers sometimes store onions in their warehouses when the onion prices rise. They sell to retailers and consumers.

**Retailers:** Procures onions from a large, local trader or a wholesaler in Dhaka. They include representatives of supermarkets, online marketeers and grocery shops, but also market sellers with a fixed stall, sellers with a mobile stall, and owners of a small grocery shop (Bangladesh Bureau of Statistics, 2015). Their stores sell to consumers.

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### 3.3 Issues in the onion value chain per stage

Figures 7 and 8 illustrate the final onion value chain maps made by the two different workshop participant subgroups. Although the two maps differ from each other, the issues identified by both groups were combined. For each stage of the onion value chain, the issues noted by the workshop participants are explained in the text below.

#### 3.3.1 Production

For the production stage, there were two different issues addressed in the workshop. Firstly, a large number of smallholder farmers lease land to cultivate onions. Thereafter, farmers buy inputs, such as fertilizers and pesticides, on credit from dealers. Buying products on credit involves higher prices than direct purchases. According to the workshop participants, a lack of knowledge results in the farmers following the dealer's instructions to apply a high dosage of fertilizers and pesticides. Following the dealers' instructions leads to onions of poor quality, with a high moisture content, and that spoil easily. The poor-quality onions must be sold quickly after harvest, and through a high market supply, the prices that the farmer receives are low. In addition, if the farmers apply excessive quantities of fertilizers and pesticides they purchase more, resulting in higher expenses than if they were to apply less fertilizers and pesticides. Secondly, the shortage of modern storage facilities means the onions may end-up being stored in the farmers' homes. The onions do not dry properly in the home environment, and are prone to rot, with subsequent severe losses. Finally, a lack of information about supply and demand impacts farmers and local aggregators and causes price volatility all year round. Without a forecast, farmers are not able to change their cultivation crop from onions to another crop, as they will not know if supply will exceed the demand.

#### 3.3.2 Aggregation and local storage

Road conditions and vehicle quality for the transportation of onions are poor, which leads to an increase in transportation time and, therefore, product losses. Transportation is via open trucks, with onions exposed to rain and heat, both of which can cause rot. Additionally, during inter-district transportation, payments have to be made to the police, which increases the transportation costs. The additional costs are transferred to the consumer through higher onion prices, as the profit for transporters are fixed. Furthermore, delays in inter-district dealing can lead to higher transportation costs, as the transportation vehicles are required for a longer period of time. This also increases retail prices.

#### 3.3.3 Wholesale and temporary storage

Importers import onions all year round without any governmental forecast information regarding demand and supply. Import during the harvesting months, results in price drops and farmer difficulties to recall their production cost. For small- and large, local traders, import during harvest negatively impacts the prices at the wholesale market, because the supply is higher than the demand.

In most cases, importers bring onions from abroad through land and seaports. Delays in transportation sometimes occur, resulting in onion spoilage and higher transportation costs. Moreover, Bangladesh's truck capacity is lower than India's, leading to extra costs of transport and labour. Transporters are also more expensive at the border than in the rest of Bangladesh. Trucks are only allowed to transport onions to Dhaka wholesale markets after twelve am, increasing the transportation duration and, therefore, costs. When the trucks arrive earlier than twelve am, they must wait.

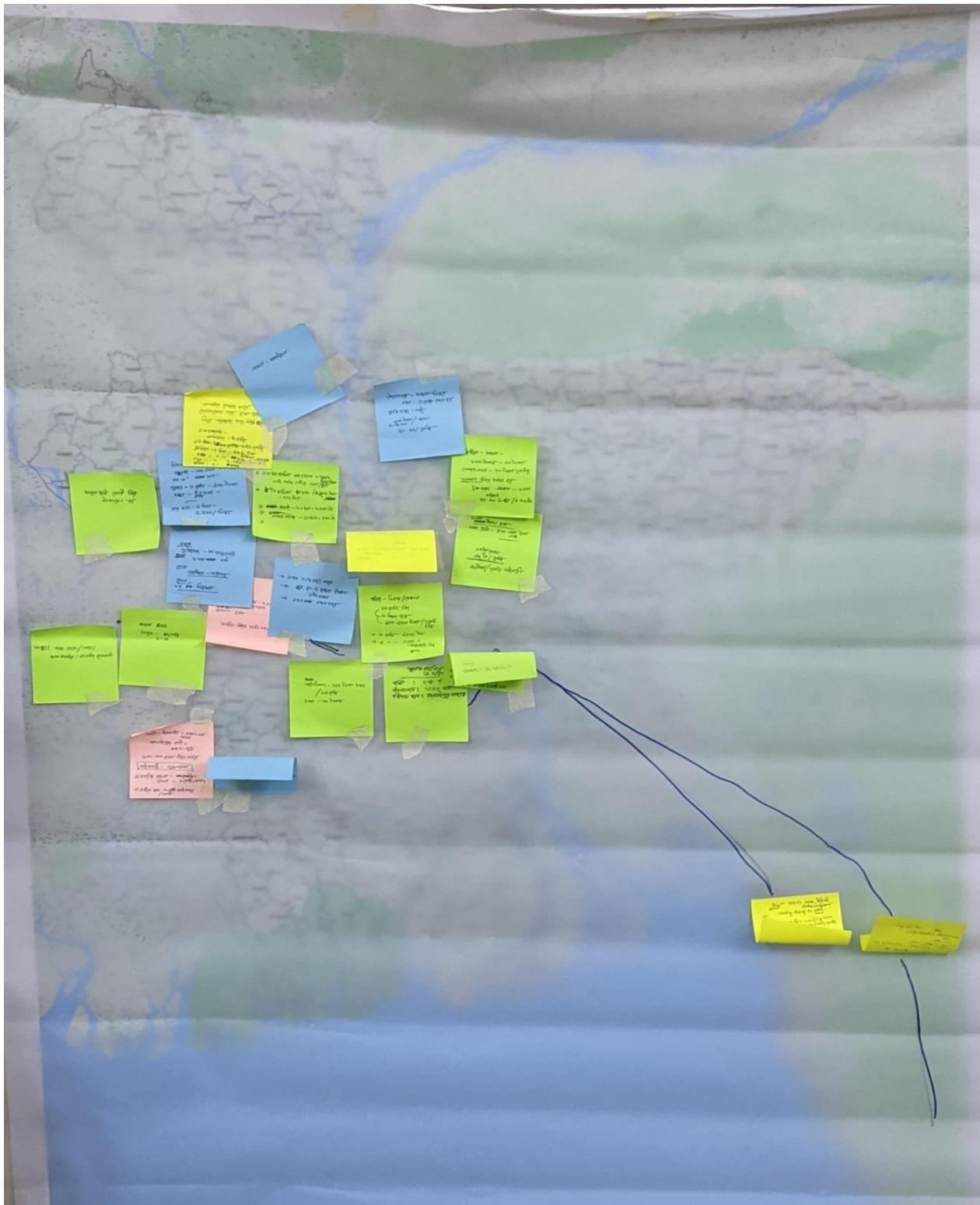
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### 3.3.4 Retail sale

Local stock keepers, wholesalers and transporters have formed cartels within their community, making sudden price surges at each stage possible. The cartels force other actors to respond when price fluctuations occur to prevent more losses. The burden of the additional costs is transferred to consumers. Middle- and low-income consumers try to compensate this price rise by reducing their consumption.

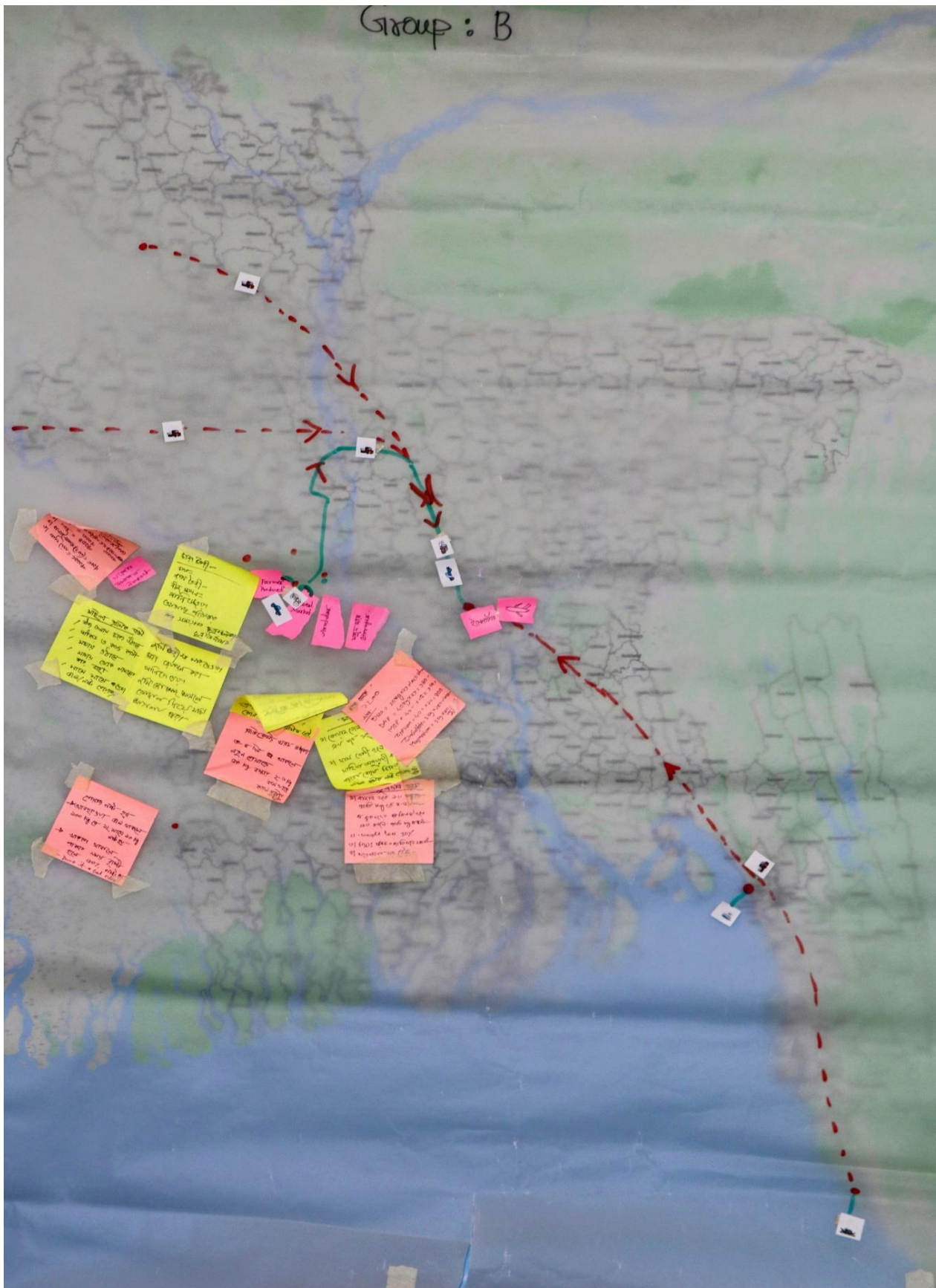
During the session on issue identification, potential solutions for the issues were proposed by some of the workshop participants. Although gathering potential solutions was not part of the objective of the workshop, we included them in this report to provide a complete account of the onion value chain workshop. The mentioned potential solutions were:

- The Government could provide loans to farmers, which would reduce their dependency on agricultural input dealers. The reduction in dependency could also increase farmers' productivity, as farmers would have the freedom to use good quality inputs.
- The Government could provide subsidies to farmers for the purchase of agricultural machinery, which would reduce labour costs.
- Development of a Government website that would provide a forecast on the demand and supply of onions, so actors could better time their harvest and earn more money.
- Knowledge provision to farmers about cultivation, handling and storing onions based on scientific research through continued training by the Department of Agriculture Extension.
- Development of an infrastructure to store onions.
- Measures to reduce transportation delays at sea- and land ports during the import process that would result in lower transportation costs and onion spoilage.



**Figure 7** The final map of group A, with the lines illustrating the onion transportation routes to Dhaka and the sticky notes illustrating issues in the different stages of the onion value chain.





**Figure 8** The final map of subgroup B, with the lines illustrating the onion transportation routes to Dhaka and the sticky notes illustrating issues in the different stages of the onion value chain.

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## 4 Discussion and recommendations

Despite the large onion production capacity, Bangladesh imports large quantities of onions each year to compensate for large losses in the different value chain stages. By bringing together all of the actors in the onion value chain, this workshop identified all onion value chain stages, the challenges at every stage, and the potential solutions. The workshop guidelines can be found in Appendix IV. With this knowledge, action can be undertaken to reduce the losses and stabilize onion prices. However, during the workshop, it became clear that not all relevant actors were yet identified, i.e. the local onion stock keeper and the inter-district dealer. Therefore, it is suggested to undertake an additional identification of stakeholders, and to invite the newly and currently identified stakeholder groups to discuss the onion value chain and the challenges that they face.

Based on the onion value chain mapping workshop, the following steps could be explored in order to find ways to improve the onion value chain:

- Raise awareness around farmers that the Government offers incentives for onion cultivation.
- Educate farmers about onion cultivation, harvesting and storage techniques towards reducing losses of produce.
- Improve the storage facilities in rural areas on farm-level to reduce losses.
- Increase the number of processing facilities to utilize poor-quality onions for further use. Processing onions could also be useful to meet the demands when no fresh harvest is available.
- Creation of an onion demand and supply forecast, so farmers can better align their harvest with the demand.
- Improve the import process by reducing waiting time at borders.
- Monitor the prices of onions by the Government to control for price volatility at all stages of the onion value chain.
- By looking more closely at the different production areas in Bangladesh, the specific problems related to soil and labour can be further identified.

These steps were considered when listing the recommendations in the onion value chain analysis report by Kok, Soethoudt, & Vernooij (2021).

This report is an initial attempt to understand where food loss and waste could be decreased, and the food availability could be increased. In addition, the workshop facilitated a dialogue between the different stakeholder groups active in the onion value chain in Bangladesh.



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# Annex 1      Agenda of the workshop

Sl. No	Title	Responsible person	Time
1	<b>Session 1:</b> Registration and introduction		9.00- 10.00
	Registrations of the participants and ensure sitting arrangement in the group	FAO Facilitators	9.00- 09.30
	Introduction of facilitators and participants	Participants	9:30-9:40
	Speech from the Keynote Speaker	John Taylor	9:40-9:50
	Speech from the Chief Guest	Director, Field Service, DAE	9:50-10:00
	Tea Break		10:00-10:15
2.	<b>Session 2:</b> Value chain mapping, discussion, and validation of the maps through discussion and presentation by the Team		10:15-12:30
	Lunch /Prayer Break		12:30-13:30
4.	<b>Session 3:</b> Issue and potential solution identification task and presentation by the Team		13:30-15:30
	Tea Break		15:30-15:45
5.	<b>Session 4:</b> Conclusion		15:45-16:00

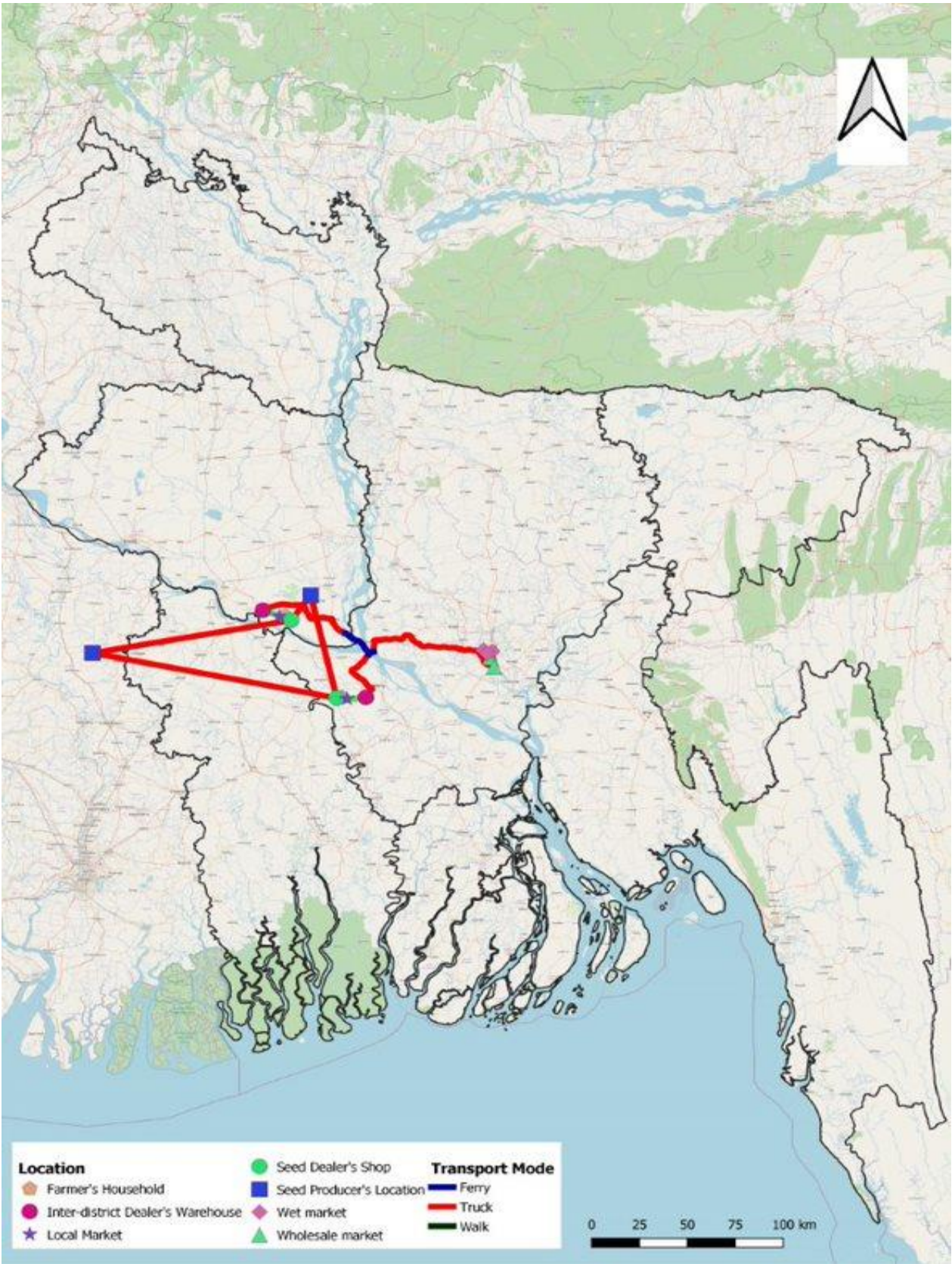
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## Annex 2 Participant questionnaire

The participants were asked the following information:

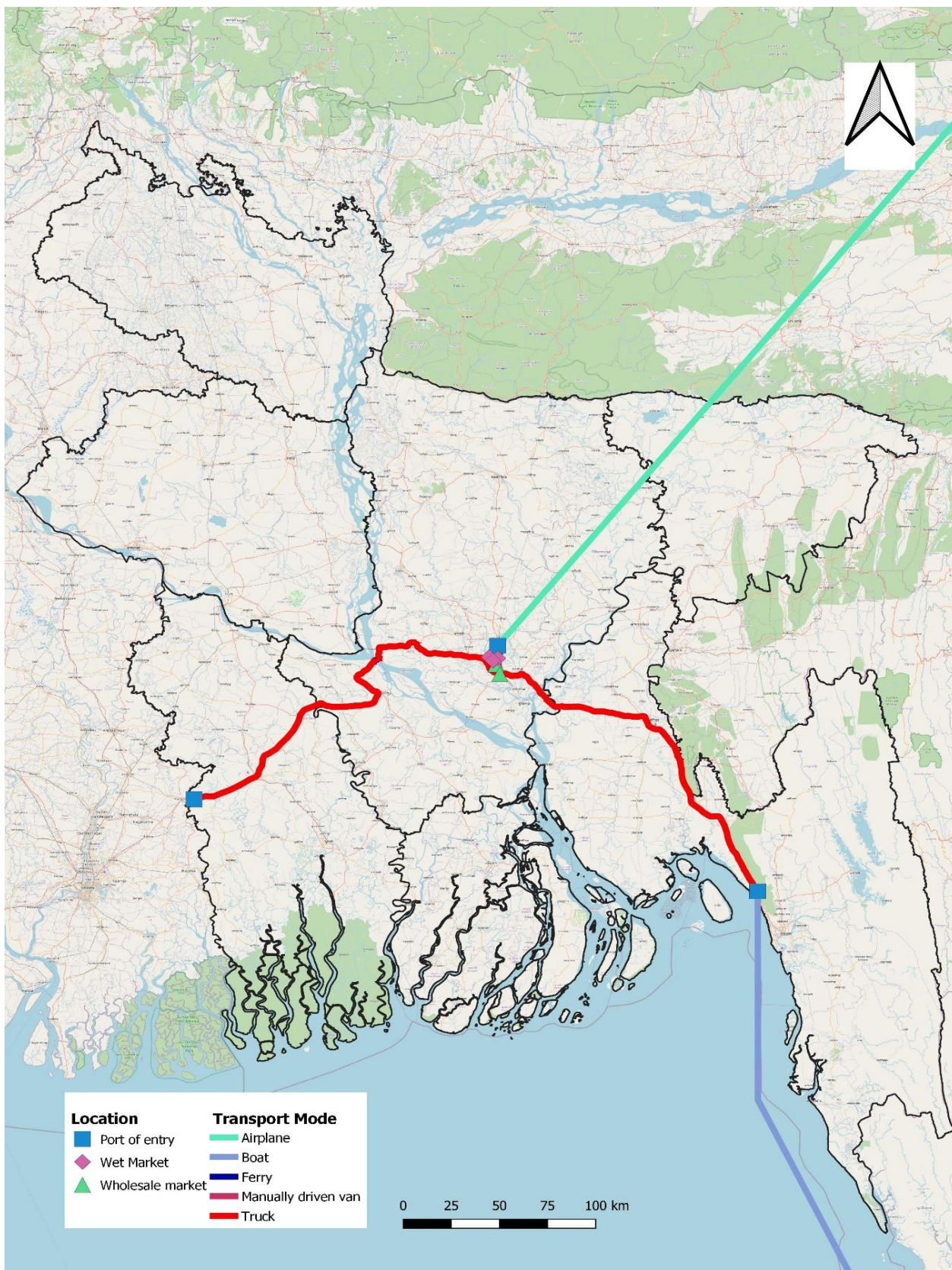
1. The geographical location of their operation.
2. The inputs of their operation.
3. The outputs of their operation.
4. The functions of their operation.
5. The cost involved in their operations.
6. Types of labour required.
7. Seasonality of the operations.
8. The cost involved in operations.
9. The forward- and backward actors.
10. The mode of transportation.
11. The issues in each stage.
12. The probable solutions.

# Annex 3      Spatial onion flow diagrams



**Figure A3.1** Spatial onion flow diagram for the traditional channel.





**Figure A3.2** Spatial onion flow diagram for imported onions.

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## Annex 4 Recommended guidelines for workshop methodology

Phase 1: Mapping of the activities across all actors of the value chain:

- Two groups are useful, with both groups including stakeholders representing of all stages of the value chain.
- Put the maps (Bangladesh and later, Dhaka) on the table.
- If issues pop up, these can be written on sticky notes which are gathered by the assistants to be addressed later. Before the workshop, a table is drawn on the issue wall: columns depict all stages of the value chain, rows represent the activities. Issues will be put on the wall at the relevant stages and activity.
- Pictures of potential issues can be placed on the side of the board, to help stakeholders remember potential issues.
- At the end of Phase 1, the developed maps will be shown to the other group. If the space in the room allows it, people can stand around the table, so that everyone can have a close look.

Phase 2: Stage-wise inventory of issues:

- Regrouping: the participants group per stage (e.g. farmers together, collectors together) and find a place to sit together.
- Discuss the issues: the ones already raised on the issue wall and the newly raised ones.
- Facilitator walks around to assist and to keep the dialogue going, the facilitator keeps asking questions.
- At the end, the issues need to be collected on the issue wall (at the relevant stages and activities).

Phase 3: Stage-wise inventory of potential solutions:

- Same groups as in Phase 2.
- Discuss possible solutions to the issues.
- Use a different colour of sticky notes (e.g. green) and add these on the issue wall, next to the issue that it would provide a solution for.

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## Annex 5 Economic costs and revenue (by K. Chowdhury)

*Note:* All prices quoted are based on price levels in January 2020.

### A5.1 Production

There are two varieties of seeds available on the market. One of the two varieties is marketed by Lal Teer Ltd. Who collect seed from farmers in Bangladesh and India, package and market it. Around 30-40% of the seed marketed by Lal Teer Ltd. Comes from India. The second seed variety comes from Taherpuri Union of the Pabna District. In comparison, Taherpuri is less productive than the seeds supplied by Lal Teer Ltd. The price of seed varies depending upon the productivity. One kilogram of Lal Teer Ltd supplied seed costs 2,000 Bangladeshi Taka (BDT) BDT, whereas one kilogram of Taherpuri supplied seed costs 1,200 BDT. A farmer uses around 12 kg of seed for each acre of land cultivated. Farmers generally optimize the use of both varieties of seeds to reduce input costs without significantly compromising the production. Seed for one acre of land costs between 14,400 – 24,000 BDT.

A variety of fertilizers are used to enrich the soil with necessary nutrients. For onion production, farmers often use Urea, Diammonium Phosphate (DAP), Triple Super Phosphate (TSP), Potassium, Gypsum, Boron, and Zinc. Among all these fertilizers, DAP is used twice; before- and after onion cultivation. The fertilizer costs for one acre of land cultivation is 1,530 BDT for Urea; 2,496 BDT for DAP; 3,744 BDT for TSP; 2,496 BDT for Potassium; 1,800 BDT for Gypsum (considering the most expensive varieties); 1,800 BDT for Boron, and 2,580 BDT for Zinc. The second application of DAP costs 5,800 BDT per acre. The aggregated cost of fertilizer for one acre of land is 22,246 BDT.

Land is ploughed using tractors. Farmers often rent tractors from tractor owners, or farmers who own a tractor. The cost of ploughing of one acre of land (which takes half a day) is 9,000 BDT.

After ploughing is complete, farmers hire labourers to sow seeds in the ploughed soil. Farmers require labourers again to spray insecticide, clean weeds between aisles and for harvesting. Labourers are paid based on the number of their work-days. Generally, service of one labour for one day costs around 500 BDT. Seed sowing, four times insecticide spraying, two times weed cleaning and harvesting require 121 days for one person. Harvesting involves uprooting and delivering onions to the household of farmers manually. The total labour costs for one acre of land is 60,500 BDT. In addition, insecticide price approximates 36,000 BDT.

Irrigation requirement varies depending upon rainfall. A season with reasonable rainfall would require irrigation twice, whereas a low rainfall season would require irrigation three times. Three times irrigation on one acre of land costs around 27,000 BDT. Farmers use ground water for irrigation, as surface water is unavailable. Most surface water sources have been dedicated to fish farming.

One acre of land can produce around 36 metric tons of onions. After harvesting and arrival of the onions at households, farmers employ women to separate scallions from onions. Onions are then segregated and sorted according to their quality. Cutting scallions, segregation and sorting require approximately 27 days for one person. Each woman is paid 400 BDT for one day of work. The total cost for these activities are approximately 10,800 BDT.

Following segregation and sorting, onions are kept on a raised platform for preservation. As onions are high in water content, it is necessary to preserve them in a dry place with good ventilation. Raised platforms, locally known as *Macha*, are used for storing onions. These are temporary structures and require reconstructing every three to four years. Despite these measures, around 15-20% of the onions are damaged, rotted or lost due weight decrease. The wasted part is not complete, as some portion of it is

actually consumed by the farmer. A *Macha* with a capacity of four metric ton costs around 5,000-7,000 BDT. Loading of onions also requires labour for two days for one person, and costs 7,200 BDT.

Farmers use jute sacks for packaging of onions. Each sack contains 40 kg, and each sack costs around 40-45 BDT. Farmers transport the packaged onions to their nearest *Haat* – a large market that congregates once or twice every week. One of the largest *Haat* in Faridpur is *Kanaipur Haat*. It congregates twice a week on Tuesdays and Fridays. Apart from *Kanaipur Haat*, there is another local market, known as *Baillgotti*. However, farmers prefer *Kanaipur Haat*, as it is closer. Sacks of onions are transported using Auto-rickshaw. One auto-rickshaw can transport 10-12 sacks. The local market is around three to four km away from the farmers' house, which takes around 15-20 minutes travel time. Cost of transportation is between 100-150 BDT.

At the local market, representatives of the market committee take one kilogram of onions from each sack as market tax. Aggregators in local markets buy from farmers. Considering 20% wastage, the approximate price of onion production is around 8.75 BDT per kilogram. Generally, one sack of onions is sold for around 600 BDT which is 15 BDT per kg. However, during high price fluctuation in late 2019, the price of one sack of onions was between 2,000-3,000 BDT which equates to 50-75 BDT per kilogram.

The production costs of onion per 40 kg of production can be found in Table A5.1.

**Table A5.1** Production costs 40 kg of onions.

Items of cost	Cost (BDT/40 kg)
Land preparation	23.93
Human Labour	290.02
Seed	75.95
Urea	10.08
TSP	19.76
MoP	5.84
Cost of Insecticide	21.45
Cost of Irrigation	72.74
A. Total Viable Cost (TVC)	519.77
Interest on operating capital @10% for four months	15.57
Rental value of land	196.97
B. Total Fixed Cost (TFC)	212.54
C. Total Production Cost (A+B)	732.31

## A5.2 Aggregation

Aggregators buy from the farmers and pay taxes to the market committee that are based on the price of the product. For a purchase of products that cost 1,000 BDT, an aggregator has to pay 10 BDT. Onions are repackaged by aggregators into transparent plastic bags of 40kg capacity. These plastic bags are only usable once. Plastic bags are preferred because the pores in the sacks allow air circulation. Packed onion sacks are loaded on to trucks, or Nosimon (a local three wheel small truck) for transportation to a bigger market (locally known as Mokam) in Saltha. Aggregators employ labour for loading and labour costs are based on number of sacks. Aggregators pay 10 BDT for loading one sack. Mokam is about 17km away from the local market and it takes about 1.5 hours to travel there. Poor road conditions make the transportation slower and often uncomfortable. Labour cost, transportation cost and tax add 0.81 BDT per kg of onions.

In Mokam, aggregators employ women for grading of onions. Around five percent of the onions are wasted at this stage. Grading is achieved based on onion size. Larger onions go into "Grade A" and smaller once are placed into "Grade B". Women are paid 50-100 BDT per sack for grading. Aggregators keep profit of 200-250 BDT per sack. "Grade A" is sold for 58-59.5 BDT per kg and "Grade B" is sold for 55-56 BDT per kg.



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## A5.3 Inter-District Dealer

Inter-district dealers buy from aggregators and transport onions to storage facilities in Dhaka city. The dealers rent trucks for transportation of the onion sacks. A truck with 15 metric ton carrying capacity costs between 15,000-20,000 BDT. Truck rental includes tolls required to use bridges or ferries, loading/unloading, and unexpected transportation costs incurred en route into Dhaka city. The distance between Mokam and wholesale markets in Dhaka city is around 130km, and travel time can vary depending upon the season. Trucks are often stuck in long queues to board the ferry. It is worse on winter nights, because of weather conditions, such as fog. If trucks arrive before midnight at the entry point of Dhaka city, they have to wait till midnight, as Dhaka city does not permit trucks inside its boundaries before midnight.

## A5.4 Wholesale and storage

Inter-district dealers sell to wholesalers for 65-70 BDT per kg. Many of the wholesalers are also owner of storage facility. Storage owners take commission from wholesalers for use of storage facilities of 0.6 BDT per kg. In addition, retailer buying from these storage facilities pay 0.3 BDT per kg in addition to the price of item. Storage facility owners have managers who receive 12,000 BDT per month as salary. A 30-ton capacity storage facility pays 3,500 BDT for electricity; 1,000 BDT for water supply and 500 BDT as service charge for the mosque. Wholesalers keep a profit margin of 10 BDT on an average. In 2019, an average importer sold onions for a price between 55-75 BDT per kg to the wholesaler or retailer. Importers also act as wholesalers.

## A5.5 Retail

Retailers buy from wholesalers for around 75-80 BDT per kg, or from an importer for around 65 BDT per kg. Generally, retailers keep a margin of 10-20 BDT. In retail markets, onions would be sold for 90-100 BDT per kg.

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