Validation of the Farmer-to-Factory™ Jute Supply Chain Model

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Picture credits: Solaiman Shukon

JUTEBORG
Jute Design Systems & Solutions

JUTELAB
International

Razzaque
Jute Industries Ltd.

INCLUSIVE
BUSINESS
SWEDEN

NCF
Nordic Climate Facility
Initiative by NDF

NDF
Nordic Development Fund

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1 Executive Summary

Jute, the golden fibre of Bangladesh, is arguably the most environmentally friendly material in the world. Yet, jute farmers often live in conditions of poverty in Bangladesh. The Swedish company Juteborg Sweden AB is exploring opportunities to improve the livelihoods of farmers and to make the value chain more sustainable. The Farmer to Factory Jute Supply Chain™ (F2F™) is a model that captures key innovative interventions in the traditional jute supply chain in order to make it more sustainable. In 2016, the F2F™ first conceptual model was developed by Juteborg. It included seven innovative interventions to make the jute supply chain more sustainable.

This report concerns the Validation of the F2F™ Model carried out by Inclusive Business Sweden, Juteborg, Razzaque Jute Industries Ltd and JuteLab International during the JutePP® project from 2018-2021, co-funded by the Nordic Climate Facility. The main objective is to have a complete, improved and validated conceptual model of the Farmer to Factory Jute Supply Chain™ that addresses the key objectives, that solves the key challenges in the traditional jute supply chain and that is accepted by the key stakeholders.

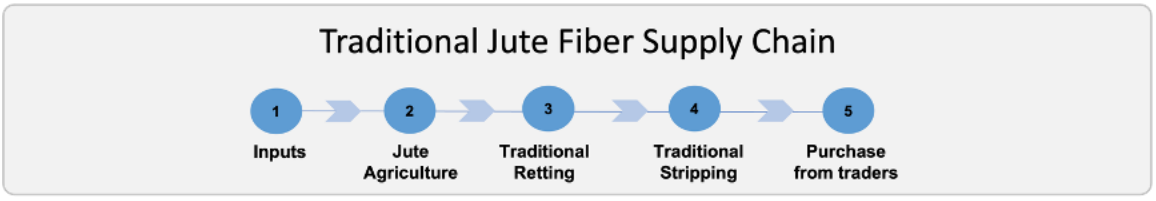
The main results are:

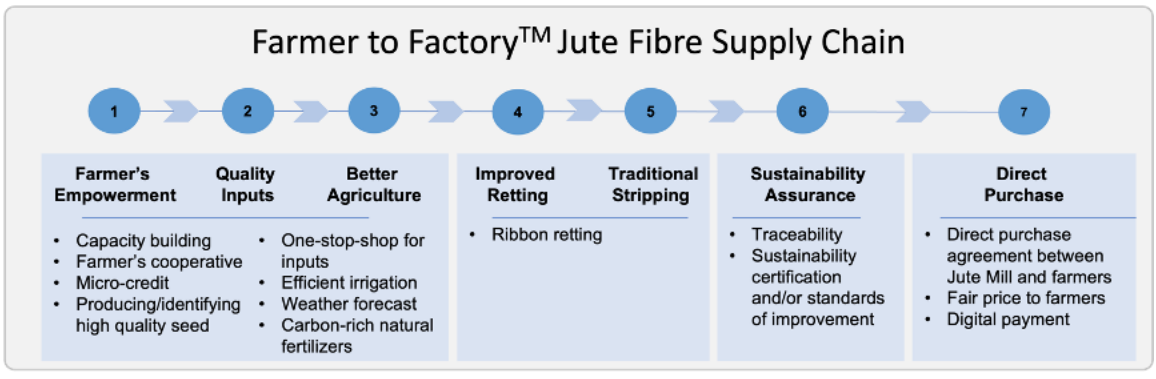
- JutePP® Supply Chain mapped, from the raw jute production to the production of JutePP® hangers.
- Thirteen (13) challenges identified upstream of the jute supply chain:
  1) Jute-based income is low
  2) Water shortage impacts the retting process
  3) Jute based high-tech market players require certification and traceability
  4) Agriculture and jute cultivation have low productivity
  5) Women are not empowered nor recognized
  6) Crops are lost or damaged due to weather, insects, and pests
  7) Quality seeds are unavailable
  8) Cash is limited or unavailable when needed
  9) Lack of skills and poor decision-making
  10) Traders have strong bargaining power due to cash and facilities
  11) Artificial fertilizers and pesticides cause negative effects
  12) Not many want to work with jute due to bad working conditions
  13) The manual labour job is becoming expensive

- Twenty-nine (29) potential solutions identified with supply chain stakeholders, which were clustered into seven categories:
  1) Empowerment
  2) Higher quality inputs and outputs
  3) Better agriculture
  4) Improved stripping and retting
  5) Increased income
  6) Attractive and valuable work
  7) Sustainability assurance

- Two solutions were tested/piloted on a small scale as part of the F2F™ validation:
    - Direct purchase: It was tested if the smallholder farmers could directly supply raw jute to the jute-mill factory without intermediates. To test this solution, a Memorandum of Understanding (MoU) was co-created and signed by the smallholder farmers and Razzaque. The direct purchase between Razzaque and the F2F™ farmers started on the 18th of September 2019 and lasted for three years/ jute-seasons. 37 farmers participated directly in the F2F™ Direct Purchase test and received an income increase. Each farmer that sells, has an estimate of 6 additional farmers working his farm. The income increase from the main farmer is distributed among the additional farmers, according to Jassim Hossain, advisor at Razzaque who has a close relationship with farmers. Once considered this multiplier, the outcome was 222 farmers participating in the F2F™ Direct Purchase test, receiving an income increase.
    - Capacity Building of Farmers: During the second workshop, jute farmers received capacity building from experts in Faridpur. 23 farmers received training on F2F™ trade conditions, climate smart practices (like the use of carbon-rich natural fertilizers), identification of high-quality jute seeds, grading of jute, etc. The training up-graded farmers' skills to better cope with key challenges they are already facing or will face in the future. Farmers participating in the training received value from it.

- One of the key deliverables of the NCF project is the validated and revised conceptual model for the F2F™ initiative (as presented in the image below). It includes 14 solutions that were selected from the validation and scoring process of all potential identified solutions.





- The project partners are prepared to lead the F2F™ initiative. Five additional service providers were identified to play an active role in the implementation of the F2F™ initiative. These are: CARE Bangladesh, Nagad, BRAC Bangladesh, Green Delta Insurance Company and Bangladesh jute Research Institute.

2 Background and Rationale

2.1 Background

Jute, the golden fibre of Bangladesh, is arguably the most environmentally friendly material in the world. Yet, jute farmers often live in conditions of poverty in Bangladesh. The Swedish company Juteborg Sweden AB is unleashing the jute potential in different sectors, such as packaging, automotive and transportation, textile and fashion, and construction and interior. Innovative companies like Juteborg aim to source raw jute from farmers in Bangladesh for the production of high-quality and high-tech jute-based products for international clients. Juteborg is committed to source sustainable raw jute fibre, thus needing to collaborate with the jute supply chain actors and the jute farmers to make sure that the most significant social, environmental, and economic issues within the supply chain have been addressed, and that the positive impact is maximized.

A premium price is within the ambitions of Juteborg. The company has had discussions with potential clients about pricing, and they seem to be willing to pay a higher price than the current market price. Yet, the price structure for JutePP® and the Farmer to Factory jute Supply Chain™ (F2F™) will be defined until after the production and when selling of JutePP® has started.

The F2F™ is a model that captures key innovative interventions in the traditional jute supply chain in order to make it more sustainable. The model was developed in 2016, by Juteborg AB. It was part of the project InTact, which was led by Inclusive Business Sweden – financed by Asian Development Bangladesh. F2F™ originated from a half-day workshop dedicated for Juteborg in Bangladesh while discussing the possible positive impact.

The initial F2F™ model included seven interventions to make the jute supply chain more sustainable, as summarized in Figure 1 and in Table 1. Interventions 1-3 in the model allow farmers to produce sustainably through capacity building and by giving them access to quality inputs, such as quality seeds. Interventions 4 and 5 allow for less pollution by exploring water purification systems and an upgraded stripping process due to the technology “Hurricane Reactor”. Interventions 6 and 7, are connected to direct Contract Farming, which is an agreement held mainly between the jute farmers (sellers) and the jute mill (buyer) regarding the production and supply of quality raw jute fibre. The agreement frequently includes predetermined conditions (agreed price, quantity, quality, etc.) as well as specified support for farmers during the production (Eaton & Shepherd 2001). The contract farming agreement shall be designed to benefit the farmers, by guaranteeing the criteria for a fair price, as well as benefiting the jute mill, by guaranteeing criteria for volumes and quality.

The seven interventions could be formalized into an evaluation and certification process to ensure compliance of crucial sustainability and quality aspects. The F2F™ model

designed in 2016 was at idea stage and still needed to be consulted and validated with relevant stakeholders.

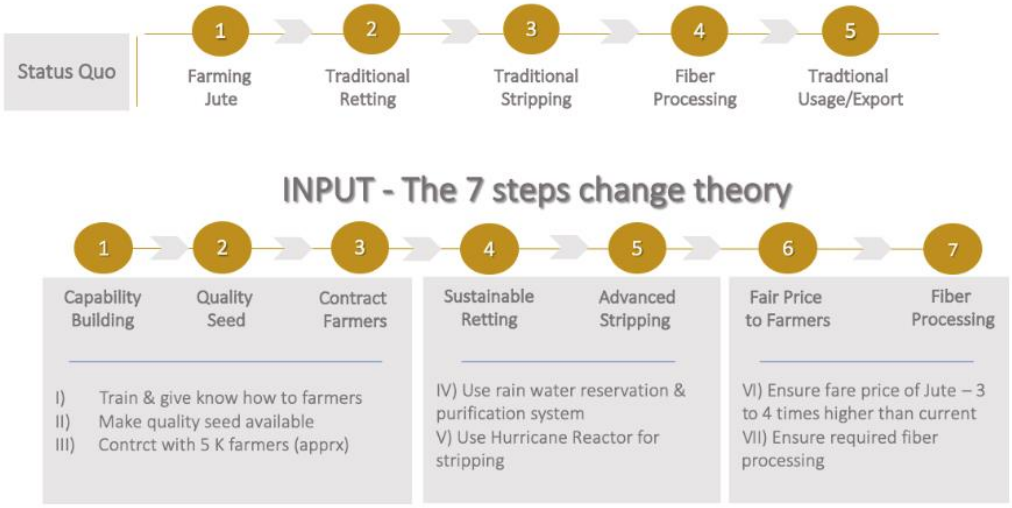


Figure 1. Theory of change for the Farmer to Factory Jute Supply Chain ™ model as first designed in 2016, considering seven innovative ideas for intervention to the traditional jute value chain. Source: Debelak, 2016.

Table 1. Seven innovative ideas for intervention to the traditional jute value chain included in the Farmer to Factory Jute Supply Chain™ model as designed in 2016.

Seven interventions to the Farmer to Factory Jute Supply Chain ™	Description of each intervention
1. Train and give know-how to farmers	Enabling smallholder farmers to build the capacity to produce sustainably – and procure sustainable conditions for them especially in relation to living incomes, human rights, and a clean production process.
2. Make quality seed available	Provide better quality seed for getting higher quality yields.
3. Contract with 5000 farmers (approximately)	Establish direct contract farming agreements with the jute farmers.
4. Use rainwater reservation and purification system	Water purification solutions to make the retting process more environmentally friendly with no contamination in the water, such as an Effluent Treatment Plant (ETP) for proper treatment of water at the end of the stripping process.
5. Use hurricane reactor for stripping	Improve the stripping process by testing a 'Hurricane Reactor' – a sophisticated technology to that strips the fibre from the

	stem in a more efficient way than traditional stripping.
6. Ensure fair price of jute – 3 to 4 times higher than the current price	Sourcing the raw jute directly from the farmers, through a direct contract farming agreement that can give farmers a fair price to empower them financially. The agreement can also include specified support for farmers during the production.
7. Ensure required fibre processing	The jute mill would be in charge of processing the raw jute fibre, using the adequate technology to create jute thread.

After the model was developed, Juteborg continued be in contact with actors in the public sector, the private sector, in development organizations and with other stakeholders in Bangladesh, Sweden and several other countries in Europe. Juteborg engaged in conversations with potential end customers of high-value jute products, from which they identified the following questions that they would like Juteborg to address:

- Is the supply chain of jute-based products able to be certified and traceable?
- Is the jute volume enough to cater potential future demand?
- Are the jute farmers receiving a fair price?

Based on the concerns and requirements of potential end customers, the key objectives of the F2F™ model are the following:

(i) Future traceability of jute fibre from seed until finished jute high-tech product
(ii) Certification of the jute fibre
(iii) Securing the volume of future demand of certified jute fibre while ensuring a
(iv) Fair price to the jute farmers

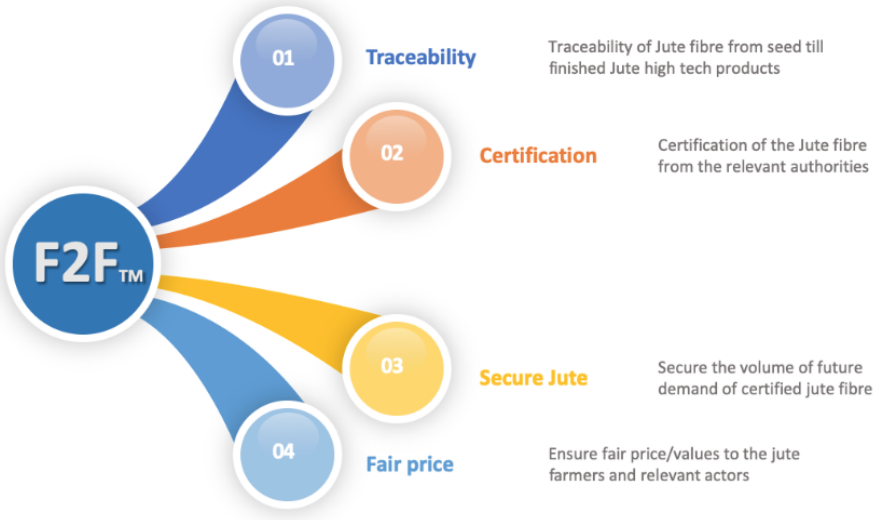


Figure 2. Key objectives of the Farmer to Factory Jute Supply Chain™ model.

3 Study Approach

This report concerns the validation of the F2F™ model, carried out by Inclusive Business Sweden in collaboration with Juteborg, Razzaque Jute Industries Ltd and JuteLab International during the JutePP® project that ran from 2018-2021. The project was co-funded by the Nordic Climate Facility.

As mentioned previously, the F2F™ conceptual model includes interventions to make the traditional jute supply chain more sustainable. Sustainability is a broad term and therefore needs to be localized to the situation of jute farmers in Bangladesh. In this study, we first take a step back from the actual F2F™ conceptual model to understand the present day-to-day situation of jute farmers in Bangladesh and to identify any significant environmental and social challenges. Once we have identified key sustainability challenges in the jute supply chain and in the jute cultivation while also considering the concerns and requirements of potential end customers, we re-visit the F2F™ conceptual model to identify any additional interventions. Having collected all potential interventions, we then proceed to validate each intervention and select a number of cost-effective interventions that then form the revised and validated F2F™ model.

Model validation refers to the process of confirming that the model is a veritable representation of the actual system under focus, achieving the intended key objectives, and solving the key challenges (presented later in this report). Most parts of the model will be validated theoretically. A theoretical validation is to be done by obtaining feedback on the model, which supports in assessing each intervention and in improving the model (Sargent, 1984; Rykiel, 1996). An exception to the theoretical validation was the testing of two important interventions in the model: the direct purchase and capacity building to farmers.

3.1 Objective

The main objective of this report is to present a complete, improved, and validated conceptual model of the Farmer to Factory Jute Supply Chain™ that addresses the key objectives, solves the key challenges, and is accepted by key stakeholders. In order to reach the main objective, these sub-objectives will need to be reached as stepping-stones:

1. Map the jute supply chain and the key sustainability challenges upstream of the value chain
2. Have a revised conceptual F2F™ model including the validated and selected interventions/solutions that address the key objectives and prioritized challenges
3. Test and assess two key interventions in the F2F™ model: the direct purchase model and the capacity building to farmers

3.2 Scope and Expectations

The jute supply chain under study includes the following activities: farming, retting, stripping, and selling jute fibre - which are the activities traditionally handled mostly by small-scale jute farmers. The F2F™ model includes interventions to improve and make the traditional supply chain more sustainable. Other interventions downstream to the raw jute fibre are outside of the scope of this study.

The geographical scope is Faridpur, Bangladesh. For the conceptual validation of the model, primary data is gathered mainly through workshops with key stakeholders, and secondary data is gathered through desktop research. The data was collected from October 2018 to December 2020. The key stakeholders (or target population) involved were smallholder farmers (30 representatives approximately) and other supply chain representatives, namely the jute traders Juteborg and Razzaque.

For the operational/on-site validation of the Direct Purchase farming model, the target was to reach and involve 1 200 smallholder farmers in the area of Faridpur. The aim was to increase the incomes of those farmers who would engage in the Direct Purchase model.

3.3 Methodology

The steps used to reach each sub-objective and eventually the main objective is as follows:

1. Map the jute supply chain and the key sustainability challenges upstream to the value chain.

The jute supply chain was mapped in collaboration with stakeholders at the workshop in Faridpur, and through interviews with key actors at Razzaque. To identify the challenges in the value chain, the validation team talked to farmers, experts, as well as other members of the value chain. The data collection from farmers was conducted through a short survey. Although all the challenges were significant, there was need to prioritize the challenges to focus on those that seemed more relevant and of higher priority. Therefore, Juteborg and Razzaque made an arbitrary prioritization of the challenges and rated them as higher, medium, or lower priority from the perspective of the F2F^{TM} initiative.

2. Have a complete list of potential solutions/interventions that can address the key objectives and solve the key challenges.

To identify all potential F2F^{TM} solutions and interventions, data was gathered through two workshops in Faridpur with the main stakeholders from the jute value chain – namely jute farmers, jute traders, the jute mill (Razzaque) and the jute fibre quality controller. In the workshops, we also invited actors beyond the value chain that could provide services, solutions, and innovations, mainly to the jute farmers. These actors came from

organizations such as CARE Bangladesh, BRAC, Nagad, Green Delta Insurance Company Limited, etc. All potential F2F™ solutions and interventions were documented and included in a complete list of solutions.

3. Test and assess two key interventions in the F2F™ model: the direct purchase and capacity building of farmers.

For the direct purchase test, the implementation team followed the steps below:
1) Presenting the Direct Purchase model at a workshop with stakeholders
2) Drafting a Memorandum of Understanding (MoU) between the jute farmers representatives and the jute mill
3) Visiting farmers to promote the F2F™ model and create a database of potential F2F™ farmers
4) Receiving and purchasing from farmers at the jute mill
5) Learning from the test

For the capacity building of farmers, the implementation team followed the steps below:
1) Identifying the areas where capacity building was needed
2) Identifying experts that could provide the capacity building
3) Inviting those experts to do capacity building for one trainer and several farmers during a workshop
4) Documenting and creating capacity building material to be used for one trainer at Razzaque

4. Validate each solution/intervention and select the solutions/interventions that can most cost-effectively address the key objectives and solve the key challenges.

To validate each potential solution, the team listed potential solutions to the identified challenges and addressed the following questions: Have the key stakeholders agreed on a practical solution to go forward? Is the solution proven to solve the problem? Are the problem owners using the solution?

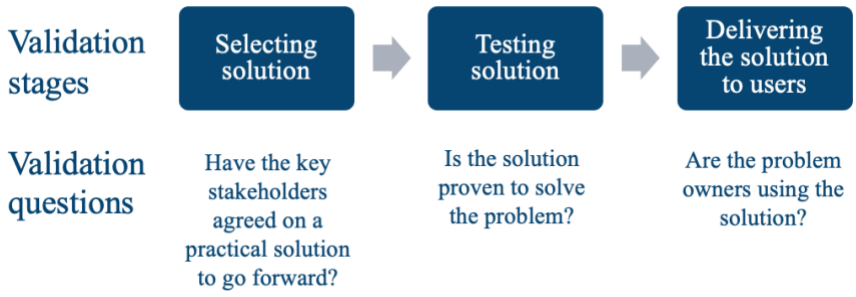


Figure 3. Validation stages and validation questions.

Each challenge was given a score from 1 to 3. The score indicates the priority of the challenge. A challenge that has a score of 3 is a priority whereas a score of 1 indicates a lower priority.

Each potential solution was given a score from 1 to 3. One point was given to each answer stating “yes” to the validation questions. The score indicates the likelihood that the solution will be implemented. A solution that has a score of 3 was rated as high viability, while a solution that has a score of 1 has low viability. The solutions and the challenges’ respective scores were multiplied to give a score to a solution. Solutions were then matched to problems. A solution addressing more than one problem, was factored into the final score. It is fair for a solution that has a large positive impact on several of the challenges to obtain a higher overall score (see Table 2).

A solution’s total score considered the challenges it addressed, the priority of the challenges, as well as the validation criteria. A score higher or equal to 14 is taken into account for the F2F™ validated model. Solutions with a score of 13 or less were not considered in the F2F™ validated model.

5. Revisit the F2F™ model as conceptualized in 2016 and complete the model including validated solutions that address the identified challenges of jute farmers in Faridpur.

The solutions with a score higher, or equal to 14 points were selected for the new validated F2F™ model.

3.3.1 Data collection

Razzaque is located in close proximity to the farmers, which comes with a great advantage. Thirty jute farmers were surveyed in Faridpur, in the vicinity of Razzaque’s factory. Information was collected regarding the jute farmers’ socio-economic situation, their challenges to produce jute fibre and their climate change awareness.

A database was prepared, including 1 200 jute farmers who had the potential to connect to the direct supply chain and participate in the F2F™ initiative. The database contains the basic information of the farmers, their income, land area, etc.

3.3.2 Workshops

To start the dialogue with the key stakeholders of the F2F™ Jute Supply Chain, we held two workshops to explore challenges and solutions connected to climate change, environmental impact, quality, productivity, and incomes of farmers. The workshops took place in the factory premises of Razzaque in Bangladesh in February 2019 and July 2019, respectively.

The purpose of the first workshop was to identify challenges as well as getting feedback regarding potential solutions to improve the situation of jute farmers and to make the value chain more sustainable. The purpose of the second workshop was to validate the solutions and to find partners that could support the implementation of the solutions.

During the first workshop, we gathered jute value chain actors and supporters, such as jute farmers, the jute mill owner, middleman, project representatives, development organisations, etc. in Faridpur. Workshop participants were asked to map the value chain, identify the challenges in the value chain, as well as present their view on selected solutions from the F2F™ concept model such as the direct purchase/sale of jute fibre, the traceability, etc. The Bangladesh Jute Minister and the local government were present to learn about the project and to show their commitment to future support of the project.

Figure 4. Participants at the workshop in Faridpur.

The second workshop focused on co-creating the probable and scalable solutions to the challenges identified in the first workshop. One specific sub-objective was to co-create strategies to increase the income for the jute farmers. A total of 32 participants took part. More than twenty jute farmers from the local area attended, including five women. Here, women are an integral part of jute farming, along with representatives of the public sector. The private sector is further crucial for jute farming through support from organizations like Nagad and Green Delta Insurance Company Limited. Also, development organisations from Bangladesh, such as CARE Bangladesh and BRAC played a major role. Representatives from Sweden and other European countries were also present in this workshop.

Figure 5. Farmers at the workshop in Faridpur.

4 Findings

4.1 Traditional Jute Supply Chain

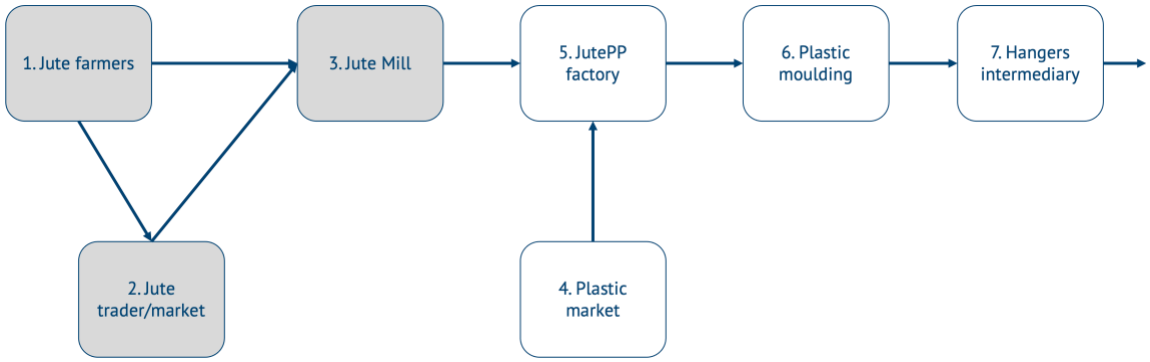


Figure 6. Existing jute supply chain mapping at the start of the Farmer to Factory Jute Supply Chain™ project.

Table 2. Overview of supply chain actors and products.

Actor	Product	Characteristics
Jute farmers	Raw dry jute fibre	Price range for 2019 (price variations depending on market price) is 28 600 Taka per ton - 56 250 Taka per ton. Amount range: 10 – 150 maunds per year, where 1 maund is equivalent to 37,32 kilograms. Average amount of land range: 1-5 acres. Productivity: 20- 30 maunds per acre.

Jute trade/ market	Raw dry jute fibre of different qualities	JutePP® with 30-50% Jute Price is slightly higher (5-15%) than plastic granules, but still competitive in the market
Jute mill	Jute yarn	Razzaque Jute yarn 6 g/m Quality grade A/B 800 – 900 USD per ton jute yarn in 2019 incl. transport (tentative price up for negotiation) Very good relationship with the farmers (10% of total), rest sourced from the market or high-volume traders
JutePP® factory	JutePP® granules	Razzaque and Juteborg have a joint venture for the production of JutePP® granule.
Plastic moulding	JutePP® hangers	Diverse potential plastic moulding actors JutePP® hangers are 10-15% higher than plastic hangers existing price Deliver on time, in full Storage Good quality – different parameters Hanger of different designs JutePP® Hangers cannot be mixed with plastic hangers Smashed product sold back Direct, good relationship with buyer
Hanger intermediary		Tam Plastik (Tam Hangers) has 49% global market share of hangers

4.2 Jute Farmer's Situation

The cultivation period is during monsoon, and jute is the only realistic crop to grow during that period since it is rain resilient.

Jute farmer's process and activities:

- Tosha is the signature Golden fibre, which is being cultivated in this area.
- Usage of artificial fertilizer is in practice during the land preparation stage.
- Jute seeds are bought/sourced from the open market and are sown during mid-March.
- Almost 100% of jute seeds are imported seeds from India.
- Right after sowing seeds, the initial 5 to 7 days are very crucial. This is the early monsoon period in which unpredicted heavy rainfall can prevent the plants from growing. However, moderate rainfall is beneficial.
- During the early stage of the plant, it is important to remove the weeds in order to let the jute plants grow higher. This ultimately produces a long fibre with high value.

- Around 90 to 120 days after seed sowing, jute plants become mature for harvesting.
- After the harvest, begins the jute retting process. Farmers cut jute plants and put them underwater to ferment, a process that takes over 2 weeks. Then, farmers manually strip the jute fibre from the jute sticks.
- During retting, fresh running water is important to maintain the good colour of the raw jute fibre which determines its value. This is the traditional retting process which contaminates the water mainly with organic matter.
- The entire process from cultivating, harvesting, retting, and stripping is a manual process. Jute harvesting and retting is labour-intensive work, and external farm labour is usually hired. There is a shortage of labour and high labour prices exist during the cutting and retting season, which are discouraging farmers to cultivate jute. The manual retting and stripping process is one of the least appealing parts of the whole labour work.
- Raw jute prices are perceived as low. Therefore, farmers are losing interest in jute cultivation. Yet, jute has additional benefits, such as cost-saving on the next crop, given that jute cultivation prepares the land for the next crop.
- There are some smallholder farmers who own the land, although most of the farmers receive their land on lease. There is also a high amount of seasonal labour that does not own or lease the land.
- Jute farmers are dependent on intermediaries since they usually do not have a direct formal or informal relationship in the next step of the value chain (the jute mill).
- Farmers usually lack cash during the jute cultivation period, when they need to pay for extra labour. Therefore, farmers often pre-sell their produce to the intermediaries before they harvest jute, as intermediaries are often willing to give a small loan/pre-payment. Here, farmers are willing to sell at a lower price. The jute price varies depending on the year and the time of the year. Farmers that pre-sell their jute, usually do not benefit from selling at the period when the market price is higher. Farmers lack the knowledge and skills needed to determine the grade of quality of their jute, which sets the price of jute. Therefore, farmers often get tricked by the traders and are not given a fair price for their jute.
- The major challenge for the jute farmers is to maintain a good relationship with the jute traders (middleman). The jute value chain is dominated by the jute traders (middlemen) due to their liquid cash strength, capacity for storage, transportation, and quality-based categorization as well as their ability to sell at higher volumes and lower prices. They possess strong bargaining power by being the only bridge between the jute mills and the jute farmers.

4.3 Challenges

There were 13 challenges identified that can make the jute Supply Chain more sustainable, especially the upstream of the chain.

Table 3. Identified challenges in the jute value chain.

Higher priority	
1. **Jute-based income is low* (*also including high costs)**	Jute cultivation has low profitability. Therefore, farmers are starting to lose interest in jute cultivation. Nevertheless, there are opportunities for farmers to earn more.
2. **Water shortage impacts the retting process**	Water shortages affect the retting process. It is important to have fresh running water to maintain the good colour of the raw jute fibre, as the colour is one of the factors that set the value of the jute.
3. **Jute-based high-tech market players require certification and traceability**	There are key challenges in the jute value chain that need to be addressed. Clients of jute end-products are already asking to kick start the process of certification and traceability.
4. **Agriculture and jute cultivation have low productivity**	On average, farmers in Faridpur have significantly lower yields than in India. Smallholder farmers' low productivity is due to technical inefficiency as a result of their lack of technical skills and bad use of inputs.
5. **Women are not empowered nor recognized**	Women's work in agriculture is not recognised despite the fact that they constitute more than half of Bangladesh's agricultural labour force. They contribute to actively and share tasks with their husbands, but they are only considered as unpaid family workers.
Medium Priority	
6. **Crops are lost or damaged due to weather, insects, and pests**	Crops are lost or damaged due to weather, insects, and pests. Jute early plants are vulnerable to floods or shortage of water. In order to grow jute seeds, moderate rainfall from the early monsoon period is needed.
7. **Quality seeds are unavailable**	Due to the lack of local seeds, Bangladesh imports almost 100% of its seeds from India, but Indian seeds are of lower quality.
8. **Cash is limited or unavailable when needed**	Farmers pre-sale their jute in order to have access to cash early in the season to cover their costs. Moreover, access to financial tools is limited, farmers lack access to bank accounts which means they do not have transaction history to look for availing formal loans.

9. **Lack of skills and poor decision-making**	Most farmers lack basic education and are illiterate and have not received training or education in agriculture. Farmers cannot make informed decisions in many crucial cases, for example when it comes to determining the price of jute in the open markets, because there is a lack of access to data.
10. **Traders have strong bargaining power due to cash and facilities**	Jute traders possess strong bargaining power as they have purchasing power, storage facility and knowledge; also, they act as sole middlemen between jute mills and jute farmers making farmers very reliant on them.
Lower priority	
11. **Artificial fertilizers and pesticides cause negative effects**	Farmers rely heavily on artificial fertilizers which cause environmental issues such as burning, delaying the emergence, and causing the death of plant as well as higher pest resistance.
12. **Not many want to work with jute due to bad working conditions**	The youth is massively leaving rural areas to move to cities because agricultural work is hard, risky, provides low wages, and carries low self-esteem.
13. **Hired farm labour is becoming expensive**	Farmers need extra seasonal labour to support during the peak workloads. Hiring seasonal labour is the highest cost borne by farmers during the jute cultivation.

4.4 Potential Solutions

Jute Supply Chain actors have identified 29 potential solutions to improve and to make the supply chain more sustainable. These solutions were clustered into 7 groups.

Table 4. Farmer to Factory Jute Supply Chain™ potential solutions to improve and to make the supply chain more sustainable.

Potential Solutions	
Empowerment	1. Capacity building for farmers 2. Farmer's cooperative 3. Micro-credit

Higher quality inputs and outputs	4. Producing own seed 5. Identifying high quality seed 6. One-stop-shop for agricultural inputs and services
Better agriculture	7. Sowing machine 8. Reduce insect plagues 9. Disease plant diagnostics 10. Efficient irrigation 11. Nurseries for jute plants 12. Weather forecast by SMS 13. Weather insurance 14. Carbon-rich natural fertilizers 15. Timing of jute seed sowing
Improved stripping and retting	16. Ribbon retting 17. Rainwater reservation system 18. Water purification 19. Hurricane reactor
Increased income	20. Direct contracting with farmers 21. Direct purchase with digital payment 22. Fair Pricing Arrangements 23. Selling or valuing jute by-products 24. Grading of raw jute
Attractive & valuable work	25. Jute branding 26. Involving and lifting youth
Sustainability assurance	27. Traceability 28. Traceability through blockchain 29. Sustainability certification and/or standards for improvement

4.5 Validated Solutions

From all potential solutions, 14 were selected following the scoring method described in the methodology. All of these solutions received a score higher than 14 points, except two solutions: Carbon-rich Natural Fertilizers and Traceability. These were included despite not reaching the scoring threshold. The first, Carbon-rich Natural Fertilizers, is included due to the recognition of the great environmental challenge of loss of soil fertility attributed to synthetic fertilizers. The second, Traceability, is included as it is one of the key objectives from the F2F™ model. Descriptions of each solution and how it addresses the identified challenges can be found in the Annex.

Table 5. Farmer to Factory Jute Supply Chain™ validated solutions to improve and to make the supply chain more sustainable.

Solutions		Description
Empowerment	**1. Capacity building for farmers**	Capacity building will allow farmers to improve their knowledge in agriculture.
	2. Farmer's cooperative	Farmers' cooperatives will allow for farmers to be more empowered and have access to information and ideas, pool resources and lower production costs.
	3. Micro-credit	Micro-credit allows farmers to have access to loans at a preferential rate and invest in their agricultural needs.
Higher quality inputs and outputs	**4. Producing own seed**	Producing their own seeds will allow to have higher quality seeds and, consequently, higher productivity.
	5. Identifying high quality seed	Testing, identifying, and using quality seeds will increase productivity.
	6. One-stop-shop for agricultural inputs and services	One-stop-shop will allow farmers to have easier access to agricultural inputs such as seeds as well as advice on best practice, thus allowing them to be more productive and to lose less crops.
Better agriculture	**7. Efficient irrigation**	Bette irrigation will allow to not lose jute plants to drought, and consequently to have higher productivity.
	8. Weather forecast by SMS	By having access to weather forecast, farmers will be able to anticipate and prepare for weather hazards and lose less crops, leading to higher productivity.
	9. Carbon-rich natural fertilizers	Using natural fertilizers will avoid the damage of jute plants caused by synthetic fertilizers, leading to higher yield and productivity.
Improved stripping and retting	**10. Ribbon retting**	Ribbon retting reduces time needed and the amount of water used.

Increased income	**11. Direct purchase with digital payment**	Digital payment allows instant payments, keeping track of transactions and to have access to formal loans.
	12. Fair Pricing Arrangements	Pricing Arrangements will ensure farmers get paid fairly.
Sustainability assurance	**13. Traceability**	Traceability will ensure that the jute fibre which is produced according to sustainably criteria is traced and controlled.
	14. Sustainability certification and/or standards for improvement	Certification will ensure compliance in terms of social, environmental and economic sustainability criteria.

4.6 Tested Solutions

4.6.1 Capacity Building for Farmers

Jute farmers in Bangladesh inherit their skills. The majority of the jute farmers do not have formal education. Thus, many of the farming practices are performed without having clear understanding about the benefits. Jute farmers, even when interested in selling directly to Razzaque, lack the knowledge and skills needed.

During the Validation of the F2F™ Model there were several sessions of capacity building hosted by experts and provided to jute farmers in the Razzaque factory in Faridpur. 23 farmers received training on Climate Change responses, F2F™ Trade Conditions, use of natural fertilizers, identifying high quality jute seeds, the grading of jute, etc. The training up-graded farmers' skills to better cope with key challenges that the jute farmers in Faridpur are already facing or will face in the future.

The task that women usually take is the drying of jute (once the jute comes back home), yet they don't get paid directly but they are benefited indirectly from the income that their husband earns. Since it is a family context, it is hard to make sure that there is a formal payment for the women's job. One of the solutions ideated in the F2F™, is for the women to have their own independent economic activity, namely seed cultivation. During the project six women received capacity building on seed cultivation. After the capacity building on seed production, Razzaque followed up with some of the farmers to ask if they had grown their own seeds but could not find anyone that had grown their seeds. There needs to be continued efforts in the F2F™ initiative for women to have their own economic activity in a sustainable manner.

A strategy to streamline the capacity building process, is for the experts to provide an in-depth training to assigned F2F™ trainers in each village. Razzaque has one trained person, and the training material is adapted to be delivered to trainers. This adaption was

conducted to ensure that the training can be delivered by Razzaque (or another organisation) in the future.

4.6.2 Direct Purchase

This solution is at the heart of the F2F™ Model, and therefore the team not only validated the solution, but also tested a small pilot program during the NCF funded project. During the project, the implementation team followed four main steps: 1) presenting and validating the Direct Purchase model in a workshop with stakeholders, 2) drafting a Memorandum of Understanding (MoU) between the jute farmers representatives and the jute mill, 3) implementing the pilot of Direct Purchase, 4) learning from the test.

Memorandum of Understanding

One important part of the F2F™ Model is the formal of a MoU to establish a direct supply chain between the jute farmers and the jute mill. During the first workshop, the value chain representatives worked to identify the major elements of the MoU.

The MoU includes conditions for quality, moisture, price, and payment method and entails commitments towards better prices to farmers. According to the MoU, the jute farmers will get the payment as per the market price. Our assumption is, since the middlemen are excluded, that the base market price will eventually increase and lead to a higher income of the farmers. The MoU was signed by Razzaque, JuteLab and six farmer representatives who informally represent 1 200 farmers. JuteLab also participated in the contract, playing a role in connecting farmers to the value chain and ensuring better prices to the farmers.

Test of Direct Purchase

The direct jute purchasing between Razzaque and the F2F™ farmers has started on the 18th of September 2019. The purchasing took place according to the terms and conditions agreed in the signed MoU. Razzaque purchased jute fibre directly from the F2F™ farmers who would come to them to sell their crop to the factory in Faridpur, regardless of the amount. The F2F™ farmers are paid by Razzaque upfront in cash for their produce and sale. Right now, jute sold to Razzaque is used for making jute yarn for other purposes than JutePP®. Once the JutePP® factory starts production, the F2F™ yarn will serve as input for JutePP®.

In 2019, Razzaque received a good response from the farmers about the initiative of selling their crop directly to the jute mills. Razzaque staff approached farmers personally to encourage them to sell. Despite their hesitations, they were able to get a good response. The year 2020 looked a bit dimmer in terms of farmers wanting to sell directly to Razzaque. In 2020, there was a shortage of jute and farmers were getting an abnormally high price from the market and thus did not show much interest to

sell directly to the jute mills. In 2020, Razzaque did not put as much time and effort to promote and encourage the farmers to participate as in 2019.

Farmers get a higher price when selling directly to Razzaque Jute Mill through the F2F™ initiative, than selling to the traders. The farmer income is higher because of three factors:

- The Jute Mill provided a higher price to the farmers than to the market price, 20-30 BDT higher than market price. Razzaque Jute Mill provided a price or the farmers which was equal or higher than to the intermediaries.
- Razzaque Jute Mill does not practice the Dholta, which is to take for free 1-2 kg of jute per maunds, which es equivalent to providing 2,5 – 5% of the total jute for free.
- Razzaque Jute Mill grades the quality of the Jute correctly, therefore giving a fair price for the assessed quality. It is known that traders often rate the quality of jute lower than the real quality in order to pay a lower price for the jute.
- Razzaque not only rates the quality correctly, but also provided a training to farmers on how to assess the quality themselves.

4.7 Potential Partners

Key actors are identified as the probable solution providers:

- Juteborg Sweden AB is the initiator, the IP holder of the F2F™ model and the driver of the concept to execute. Juteborg's sustainable green business production will be the change agent behind the executed F2F™ Model. Juteborg is also the international promoter and communicator of the F2F™ platform.
- Razzaque Jute Industries Ltd is gathering the farmers, buying directly from the farmers, trying out new farming technologies, methods, and processes as part of the workshops discussions. They are the first jute mill probable to become a F2F™ certified jute mill.
- Inclusive Business Sweden (IBS) is part of the F2F™ Model validation as they are expert in inclusive business modelling. IBS contributed to the design of the F2F™ model and has validated the model.
- CARE Bangladesh (international NGO) can provide one or more solutions to the jute farmers, namely the farmer's cooperative and the one-stop-shop.
- Nagad offers a digital payment solution. A 50:50 private-public initiative in Bangladesh brought the solution for instant payment which can minimize the instant money transaction challenge between smallholder F2F™ farmers and the jute mill during direct purchasing.
- BRAC Bangladesh is the world's largest NGO and brought a solution around providing micro-credit facility for the jute farmers when they are in need of emergency cash in jute season.

- Green Delta Insurance Company (first implementer of agricultural insurance together with World Bank in Bangladesh) brought a custom solution for the jute farmers to safeguard against critical weather-related risks (incl. climate change risks), especially during the jute seed sowing season.
- Bangladesh jute Research Institute (BJRI): Chief scientific officer from BJRI (Mahbubul Islam) brought solutions to farmers regarding how to grow their own jute seeds and how to select the best quality jute seeds which are one of the key challenges for the jute farmers.

5 Conclusions

5.1 Lessons Learned from the Direct Purchase and the Capacity Building

The Direct Purchase model was received well by many farmers, yet there are significant systemic challenges that must be understood and overcome before the model can be tested on a larger scale.

- The farmers were extremely happy and astonished with the fact that they were paid upfront with a higher price compared to the market price. The first F2F™ farmers encouraged others about the benefits of the direct sell to the jute mill of Razzaque. This positive word of mouth is really important to establish such new practice.
- Many jute farmers pre-sell their crops to traders. A lot of traders give this small loan/pre-payment, and farmers are willing to sell at a lower price because of they are receiving it earlier in exchange of providing assurance that the jute will be sold to that trader.
- Traders put pressure on farmers and the Jute Mill to not trade directly. Farmers do not want to spoil the relationship with the traders by signing the MoU with the jute mill.
- Lack of trust in the F2F™ model, because of its novelty. Farmers are afraid regarding where they will sell their crops if the jute mill does not buy anymore. There is no precedence that jute mill purchases directly from the farmers, so there is uncertainty and doubt.
- Jute market price alters the dynamic. For example, in 2020 due to a shortage of jute that year, the market price was very high and thus farmers were not showing much interest to sell directly to the Jute Mill.
- Razzaque follows standard procedures during the Direct Purchase, such as grading the jute, checking the moisture content, etc. A small challenge for the farmers connected to the Direct Purchase is the extra waiting time during the sale.
- For Razzaque, the identified challenges were the small quantity of the jute fibre as well as issues with the small payments.
- The market price variation of jute can impact heavily on the Direct Purchase model. Since July 2020 (and until now) the price of jute drastically increased,

driving up the incentives for official/unofficial traders to purchase all the jute directly from the farmers. They even paid visits to the farmers to buy the jute from their homes directly. On the positive side, some farmers were gaining more income for their raw jute than at lower prices. Nonetheless, this affected the F2F™ test in 2020 and 2021, since farmers were disincentivized to sell to the mills directly and are in some cases stockpiling their jute crop for even higher prices. This is a variable that was not taken into account during the design of the F2F™, and we presume it has affected the testing of the model.

Potential solutions:

- Build relationships (and trust) with the farmers: We need to continue to build the relationship with farmers. During the NCF validation, Razzaque staff visited the farmers' homes. It is important to establish a personal connection and to exercise persuasion at least in the beginning. Farmers received a contact number from Razzaque's staff. Jassim Hossain, advisor at Razzaque was the contact person for the farmers, who they could call before going to sell to Razzaque.
- Organize small purchase points in the market: Razzaque will explore the idea of putting selling points in the market. Before the next jute season (July 2022), Razzaque intends to put at least four buying points in the market for farmers that go directly to the market. *"We have to do it, because if we don't take the initiate no one will"*, says Jassim Hossain, advisor at Razzaque. The risk is that this could jeopardize the relationship between Razzaque and the traders. Razzaque would need to give the traders continuous opportunities to sell their products.
- Agree with traders about a win-win situation: If the traders exert too much pressure on the farmers and on Razzaque, there might be the need to evaluate how to integrate them into the F2F™ Model in a manner where the farmers can still earn a higher/fair income. Razzaque has at the moment 100-150 traders which provide it with high volumes of jute of different grades and from different parts of the country and is therefore reliant on traders.

The capacity building test showed that farmers were receptive to gain new knowledge and develop new training. The farmers were quite enthusiastic to learn new knowledge and skills. We learned that also Razzaque's staff was enthusiastic and started implementing some of the learnings. The training was too short to measure properly if the learnings were applied by the farmers. One learning is that it is best for the training to be implemented directly by the experts - at least in the beginning. And that there needs to be a formalized, longer training program that includes theory and practice.

5.2 Validated Farmer-to-Factory™ Jute Supply Chain Model

This work has identified the potential solutions to improve and to make the traditional jute supply chain more sustainable, as shown in Figure 7 and Figure 8.

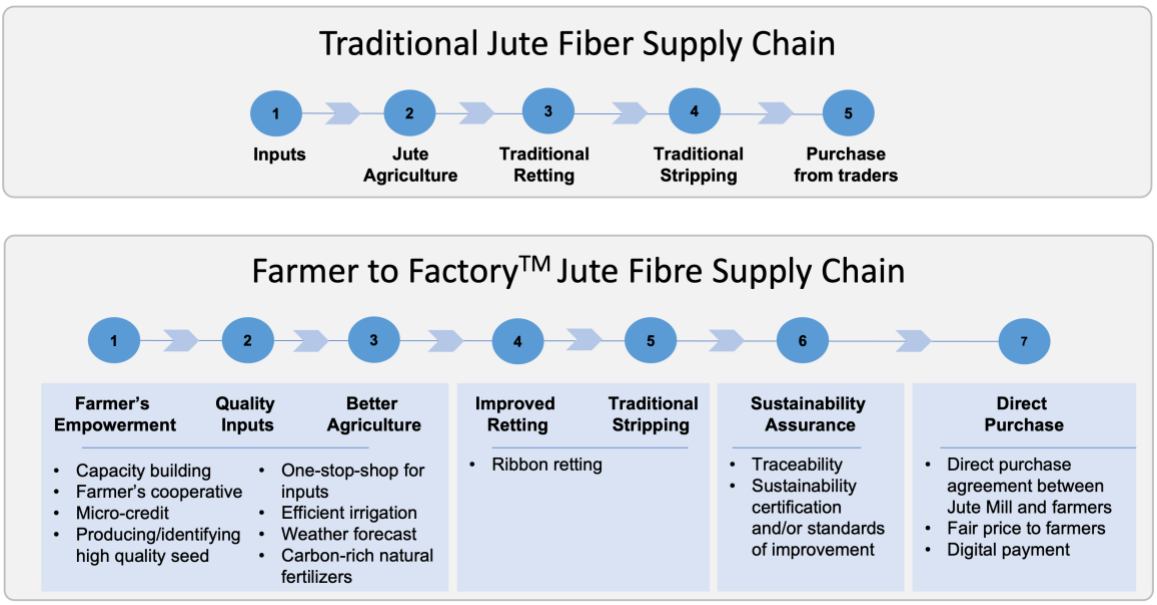


Figure 7. Theory of change to improve the Traditional Jute Fibre Supply Chain, with validated solutions.

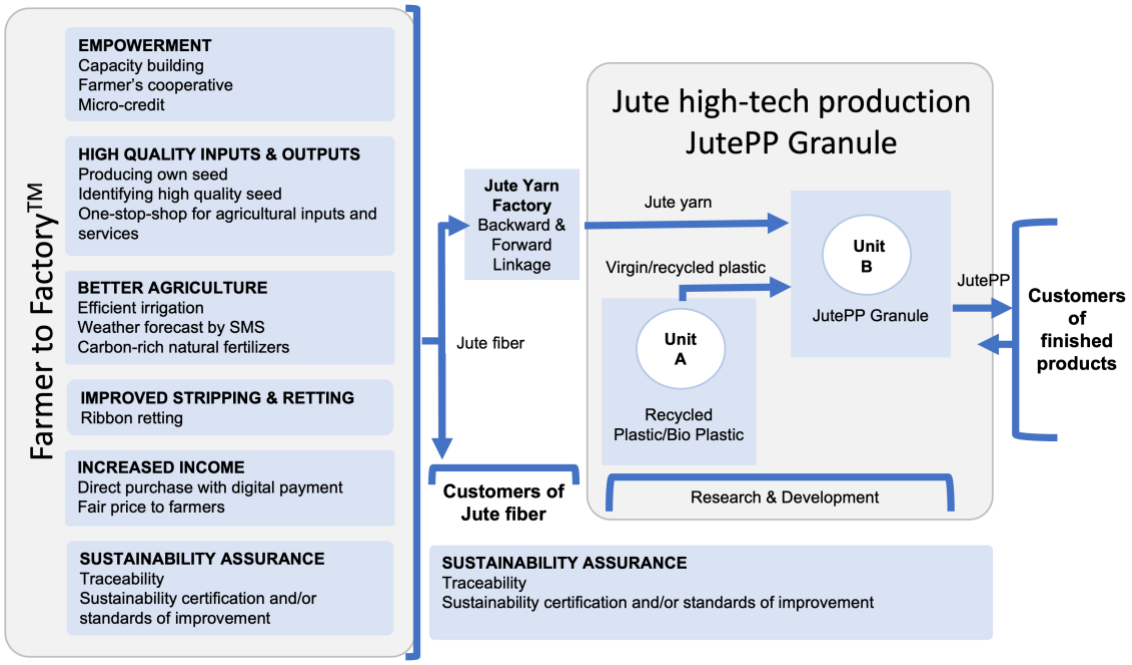


Figure 8. The Farmer to Factory Jute Supply Chain™ validated concept that includes the 14 selected solutions to improve the supply chain.

Next suggested steps for the F2F™ Initiative are:

- Feasibility study for selected solutions included in the validated F2F™ Model.
- Once the JutePP® green business model has been tested and the JutePP® production started, we can start the preparation of the F2F™ Pilot, since the JutePP® business model is the driving force behind the F2F™ Initiative. During the F2F™ Pilot preparation, resources and partners will be sought after. We drafted a Letter of Intent (LoI) to ask the potential partners if they would like to

pilot the partnership. These LoI will be sent to partners during the F2F™ Pilot preparation.

- Design the F2F™ Pilot, taking into account the lessons learned from the tested solutions. The suggestion is to continue piloting in a stage-wise approach, further selecting a couple of solutions that can be piloted next.

6 Annex

6.1 Annex Challenges

6.1.1 Jute-Based Income Is Low

Farmers are often smallholder farmers who, for the most part, do not own the land but get the land on lease. Additionally, there is a high amount of seasonal labour that does not own the land but works in the jute fields. As of September 2019, farmers spent on average between 1 500 to 1 550 taka per maund and earned on average between 1 300 and 1 500 taka per maund (Hasan 2019).

Jute cultivation has low profitability. Therefore, farmers are starting to lose interest in jute cultivation. This project has carried out the Cost-Benefit Analysis of jute cultivation (done by Juteborg and Razzaque) in order to understand challenges and opportunities for farmers to earn more.

The Cost-Benefit Analysis showed the following result: “The jute farmers return on investment is around 13% for one-hectare land area during the 4 to 5 months of the Jute season leading to net profit of BDT 6 000 (SEK 600 approximate). According to this calculation, the jute net incomes for farmers seems low. Jute cultivation profit is not the same every year because the jute prices change from year to year. In terms of costs, the majority of costs applies for hiring manual labour during the jute season. The Cost-Benefit Analysis showed that approximately 82% of the costs of jute cultivation are additional farm labour hired for weeding, harvesting, retting, stripping, and drying (Jutelab International and Razzaque jute Industries 2019a). Weeding operations constitute about a third of total operation costs (Islam & Ali 2017). Jute cultivation is highly labour intensive. Nevertheless, we assume that jute continues to be cultivated because the cultivation season is mainly during monsoon when scarcely any other crops can be cultivated. Jute cultivation remains the best crop option in the crop rotation for farmers. Thus, it is an effective risk mitigation measure for farmers in general.

There is an uncertainty on the reliability of the data collected for the Cost-Benefit Analysis. Razzaque was trying to collect data, but most farmers are illiterate and/or financially illiterate. The majority of jute farmers did not track their costs. Thus, they were unable to determine the real costs vs benefits by themselves. So, the survey had to

validate by contacting most of them thrice. In some cases, jute farmers were reluctant to provide the information related to their income.

To double check the conclusions from the Cost-Benefit Analysis, Jassim Hossain, advisor at Razzaque, made his own calculations based on the jute he cultivated in 2021. Jassim found that jute cultivation was profitable that year and according to him it is profitable in most years unless the crop was drastically damaged or lost due to external factors such as drought, too much/little rainfall, pests etc.

Due to all the factors mentioned above, the only conclusion we have is that jute cultivation has low profitability. Therefore, one of the objectives of the F2F™ initiative is to increase incomes of farmers and make jute cultivation a profitable and attractive activity.

There are opportunities for farmers to earn more and benefit economically from jute cultivation (explored further as part of the F2F™ solutions). For example: jute farmers get two more by-products from jute - the leaves and the sticks. Currently, only jute fibre is a source of income. The value of jute sticks and leaves as source of energy for the household or as nutritious to human health and to the land are overlooked.

Experiments were undertaken to reduce the costs of jute production. It was found that cultivation of jute after preceding crops such as onion, garlic, potato tuber and sweet potato reduces its cultivation cost by about 20% (Islam & Bjri 2018).

6.1.2 Water Shortage Impacts the Retting Process

The jute retting process is the most important factor in producing quality fibre (Sudhiva 2017). Retting is done in pools or under slow running water. Retting is a type of fermentation process that lasts two weeks starting with the cut jute plants being put underwater; this process makes the water dirty. It is through this process that fibre comes out of the jute: bundles are kept underwater in 2-3 layers for 15 days before fibres are extracted manually (Rostom Ali et al. 2015). Traditional retting is an anaerobic process which causes pollution problems. Some farmers think that the organic matter that occurs when retting in the water is a positive thing because it fertilizes the soil, but too much organic matter becomes a problem. In the pools, the organic matter can get more concentrated. It is therefore not ideal to ret jute in a stagnant pool of water where access to clean running water is limited. It is important to have fresh and at best running water to maintain the good colour of the raw jute fibre. Excessive usage of stagnant water for retting and washing the fibre damages the colour, which has negative consequences on the price.

6.1.3 Jute-Based High-Tech Market Players Require Certification and Traceability

There are key challenges in the jute value chain that need to be addressed. Clients of jute end-products are already asking to kick-start the process of sustainability certification and traceability.

6.1.4 Agriculture and Jute Cultivation Have Low Productivity

On average, farmers in Faridpur have jute yields around 1 000 kg per hectare of jute fibre and almost twice the amount of jute sticks, according to our internal Cost-Benefit Analysis. Several research articles indicate that average jute fibre yields in Bangladesh is 1 930 kilogram per hectare whereas in India it is 2 100 kilogram per hectare. Thus, the average jute yield per hectare of land area is quite low. According to a study by Rahman et al. (2017), smallholder farmers are particularly unproductive due to a lack of technical skills. Another study by Hossain et al. (2014) showed that lower productivity was a result of farmers not using inputs correctly.

6.1.5 Women are not Empowered nor Recognized

Women represent slightly more than 50% of Bangladesh's agricultural labour force, however, their work is not recognized. In the majority of cases, women are not the heads of the households, and they are not the heads of the land either. However, they do contribute actively and share tasks with their husbands (Kanya 2020). As Bangladesh is a traditional Muslim society, women's participation in economic activities is limited. As a result, they mostly work as unpaid family workers (Jaim & Hossain 2011).

Women do not go to the fields and cut jute per se. The task that women usually take is the drying of jute (once the jute comes back home). They do not get paid directly but they are benefiting indirectly from the income that their husband earns. Since it is a family context, it is hard to make sure that there is a formal payment for the women's job.

Women are economically empowered further up the supply chain, as the women at Razzaque's jute mill make up between 75% and 80% of the employees. Here, they are processing the jute. It is most likely one of the highest percentages of women working in a jute mill. To conclude we can say that we intend to make the gender issue higher in the priority list and recognize that it is an important problem.

6.1.6 Crops are Lost or Damaged Due to Weather, Insects, and Pests

Earth's global climate is changing, meaning that there will be higher temperatures, increased rain, more floods, and more droughts. Our weather will become more extreme and unpredictable.

Forecasts by most of the climate-related research indicate vulnerability of Bangladesh to severe monsoon floods, which will increase further with climate change (World Bank 2010). Though estimates on precipitation changes vary widely across the models, most indicate up to 20 % more rainfall during the monsoon season (in July-September).

Jute is more resistant to floods than other crops, but early plants are vulnerable. In the initial 5 to 7 days after sowing, jute plants are the most vulnerable to excess or shortages of water. During that time, unpredicted heavy rainfall or drought could prevent the plants from growing. Lack of rain during seed sowing season would force farmers to use irrigation which prevents farmers from losing their crops. On the other hand, too much rain immediately after seed sowing would also damage the crop. In order to grow, jute seeds need moderate rainfall from the early monsoon period.

Extreme temperatures due to climate change seem to not be a problem for jute plants. They grow in between 15°C and 38°C (or even 46°C) (World Bank 2011; ICAI 2011).

6.1.7 Quality Seeds are Unavailable

In Bangladesh, jute is mainly grown for fibre, which is why little attention is given to seed production. A major problem within jute production is therefore the unavailability of high-quality seeds at the optimum time of sowing. The seeds determine fibre quality to a high degree (Islam & Bjri 2018).*"Quality seeds of an improved variety itself provide 20% additional yield of the crop"* (Islam & Bjri 2018, p.39)

Due to the lack of local seeds, Bangladesh imports almost 100% of their seeds from India (Bhuyan 2019). Seeds from India are of lower quality due to poor preservation: seeds are either too dry or too wet. Jute seeds are bought or sourced from the open market. Sometimes, farmers cannot grow good crops because they use poor quality seeds from the market. Farmers lack the necessary knowledge required to identify good quality jute seeds, so they pay a premium price for lower quality seeds (Palma 2008).

The extensive seed imports were not always occurred in Bangladesh. Earlier, farmers in Bangladesh grew jute seed together with the fibre crop. A jute crop requires 7-8 months to produce seeds. Farmers kept a specific piece of land for this purpose at the corner of the field during harvesting of the crop for fibre. Some seed crops were uncared for after harvesting, which resulted in poor quality seeds. External influences, such as weather, insects and diseases can easily lead to poor quality of seeds (Islam 2019).

6.1.8 Cash Is Limited or Unavailable When Needed

Access to cash is limited for the farmers when they need it, especially during the harvesting season. This is a sensitive period during which actors in the value chain with more bargaining power take advantage. This happens in different ways. One example is that farmers are given credit sales of artificial fertilizers with higher delayed payments; the fertilizer companies make most of the profit in this case and farmers pay a higher

price. Another example is pre-harvest sales of raw jute fibre to the jute traders at a lower price.

As farmers do not have access to storage or proper distribution network for jute fibres, their products become victim of negative price fluctuation; consequently, stress sales are done with lower price without considering the best price time. Access to financial tools is limited as farmers do not have bank accounts, consequently they do not have transaction history and cannot search for availing formal loans. Eventually, they are pushed to sort after loans from informal traders who charge an extremely high interest. In many cases, jute farmers take loans from jute traders. Often the loan is without interest; however, farmers are bound to sell their jute to the same trader which provided the loan, which diminishes farmers' bargaining power. Hence, the real price is not reflected between the price from farmers to traders compared to real market prices.

There are also barriers for smallholder farmers to sell directly to the jute mills. Often farmers would not get instant cash payment due to the low volume of jute fibre, as jute mill traders are reluctant to pay for a small volume of jute. Jute mills are able to provide delayed payments to the traders but not to jute farmers, which discourages jute mills to buy directly from jute farmers.

6.1.9 Lack Of Skills and Poor Decision-Making

As access to information is limited, farmers cannot make informed decisions in many crucial cases, for example when it comes to determining the price of jute in the open markets. This limits the opportunities for benefits.

The farmers lack the necessary skills when it comes to selling to the jute mills. This is also problematic because farmers want to sell directly to Razzaque, but they lack the necessary skills to do so. Farmers also lack the necessary technical knowledge such as the selection of quality seeds, the recommended doses of fertilizers and retting techniques which prevents them from using those inputs wisely (Hossain et al. 2014).

Another example we have seen during the Cost-Benefit Analysis is that farmers are not well equipped to keep track of information related to their costs (Jutelab International and Razzaque jute Industries 2019a). Consequently, they don't have the basic financial skills to calculate income, costs, or benefits.

6.1.10 Traders have Strong Bargaining Power Due to Cash and Facilities

Farmers usually pre-sell their products to the intermediaries before they harvest jute. As they depend on intermediaries, farmers do not have a direct formal or informal relationship with the next steps of the value chain. The major challenge for farmers is to maintain a good relationship with the traders. Jute traders dominate the value chain as

they have cash, storage facility, knowledge commercialising, etc. They also have strong bargaining power as they are the only intermediaries between jute mills and jute farmers.

6.1.11 Artificial Fertilizers and Pesticides Cause Negative Effects

The soil of Bangladesh is deficient in organic matter, which plays a vital role in improving physical health and nutrient elements of soil available to the plants. Most of the cultivable lands of Bangladesh are deficient in organic matter. The jute field soil is to replenish with the supplement of organic matter during land preparation, but due to intensive cultivation, Bangladesh soil is getting deficient with more nutrient elements. At the present situation, jute crop requires for its potential yield N, P, K, Zn, S and Mg nutrient elements. Most of the jute farmers in the area rely on chemical fertilizers without knowing the key benefits and risks of using it.

Artificial fertilizers are used during the land preparation stage, even though benefits are more perceived and enforced by fertilizer companies. Artificial fertilizers seem attractive because they are easy to apply, and it is easy to calculate the amount. The use of such fertilizers as well as pesticides increase production, but they also cause environmental issues: indeed, fertilizers burn, delay the emergence and, in some cases, cause the death of plants (Chakrabarty et al. 2014). Heavy use of insecticides leads to higher pest resistance as chemicals in higher concentration affect crop field as well as crop ecosystems and as pests produce a large number of off-springs with a high degree of mutation (Sadat & Chakraborty 2015). Furthermore, overuse of pesticides also destroys predators, parasitoids and beneficial microbes (Khan 2018).

Jute cultivation prepares the land for the next crop making the next crop cheaper: indeed, jute plants improve soil productivity due to its leaf fall and root proliferation in the field (Sheheli & Roy 2014).

Pests such as caterpillars and artificial shortage of fertilizers created by sellers are additional problems. Indeed, sometimes dealers create artificial fertilizers shortage in order to drive up prices and gain higher profits (Barkat et al. 2010); which worsens farmers' economic situation as fertilizers prices are high and crop prices are low.

6.1.12 Not Many Want to Work with Jute Due to Bad Working Conditions

Youth is not as interested in working in agriculture. Even among farmers, according to a survey, young farmers are more interested in other sectors. They perceive agriculture as an income generator, rather than as a passion that they could carry on for the rest of their lives. Young farmers are particularly sensitive to the volatility and risks of working in agriculture. It appears that less farmers want their children to work in agriculture as well (CGAP 2017). The youth massively leaves rural areas to move to cities (Sakiluzzaman et

al. 2018). Indeed, as a result of hard work and low wages, more agricultural workers move to the cities and the youth is no exception (Akhter 2017).

Jute harvesting and retting are heavily manual and labour-intensive work. The entire process from harvesting, retting, and stripping is manual, of which retting, and stripping are the least appealing parts. Agricultural work is unpopular in Bangladesh as it is considered to be risky and carries low-esteem (Rizwanul Islam 2016).

6.1.13 Hired Farm Labour Job Is Becoming Expensive

Jute harvesting and retting are heavy manual and labour-intensive work. The entire process from harvesting, retting, and stripping is manual. Farmers need extra seasonal labour as support during the peak workloads. Hiring seasonal labour is the highest cost beard by farmers during their jute cultivation.

The majority of costs apply for hiring manual labour during the jute season. The Cost-Benefit Analysis showed that approximately 82% of the costs of jute cultivation are additional farm labour hired for weeding, harvesting, retting, stripping, and drying (Jutelab International and Razzaque jute Industries 2019a). Weeding operations constitute about a third of total operation costs (Islam & Ali 2017).

There is a shortage of labour during the cutting, edging and jute processing seasons, which reflect a high cost for labour during the peak workloads. These high labour prices discourage farmers to cultivate jute.

6.2 Annex Solutions

6.2.1 Capacity Building for Farmers

Capacity building for farmers will support the implementation of almost all the solutions. The suggested capacity building curriculum for the F2F™ model is the following:

- Production and identification of high-quality jute seeds
- Sorting the jute fibre as per quality grading
- Production, use and benefits of carbon-rich natural fertilizers
- Efficient irrigation
- Financial management of their farm
- Improved practices to acquire the sustainability certification and/or advance in the standards for improvement (to be further defined)
- Skills needed for the farmer’s cooperative (to be further defined)

Centralizing the capacity building activities as much as possible will make it easier to manage, monitor, evaluate and standardize quality. Beyond the content, it is important to design the most effective means to provide the capacity building. One factor to consider

is the level of education of the farmers, since most jute farmers lack basic education, and many are illiterate.

A crucial aspect to capacity building is to understand how farmers absorb knowledge. The three main theories to capacity building: the diffusion school, the farmers first and the "beyond farmers first".

According to the diffusion school, knowledge is created in centres of innovation and passed down from "opinion leaders" to the farming population in a linear process. According to the Farmers first approach, rural people's knowledge is inductive and adaptative to the changes in the physical environments. According to the farmers' experiments in Africa, farmers' learning is context-specific and requires site-specific information and the tendency to experiment is widespread. People experiment more in environments with a high level of commitment to farming and in an unfamiliar environment where farming systems are highly diversified. This view argues that as farmers pursue a lot of research themselves, emphasis should be on the quantum of materials on which farmers can experiment.

More recently, developments have seen that knowledge is constructed through rural people's practices and is constantly transformed and that generation and utilization of knowledge involves elements of control, authority and power that are embedded in social relationships; this is known as the "Beyond Farmers First" approach. It appears that the "Beyond Farmers First" is the most appropriate as research finds that what farmers know and need to know is constant evolution (Care Livelihoods Programme 2004).

6.2.2 Farmer's Cooperative

One of the challenges from jute mills in purchasing directly from farmers is that it carries big transaction costs for very low volumes of raw jute. Therefore, the idea of farmers organizing under a cooperative, was born during the F2F™ validation workshops in 2019. A farmer's cooperative/group/organization will also have huge benefits for the farmers as described above, but the biggest benefit from the F2F™ perspective is that farmers would be empowered to expand their role and acquire the role of traders. Jute farmers involved in the F2F™ validation were interested in potentially developing a farmer's cooperative/group/organization. CARE Bangladesh has experience in serving as a facilitator to this process and is interested in exploring this solution further.

Farmers' cooperatives (or organizations) are membership-based collective actions formed by community members to serve the members, who are dwellers that get a part of, or all of their livelihoods from agriculture. Those cooperatives can take the form of associations, societies, unions or firms. Farmers' cooperatives have many benefits. They allow to share the information and ideas, pool resources, lower production costs, gain access to markets or serve as access point for other development actors. For a farmers' cooperative to be efficient, it must be autonomous, have an inclusive leadership as well as a strong membership base, provide needs-based services and have a clear, owned purpose.

An example of such organisations are CARE Bangladesh's Village Development Committees (VDCs). VDCs help by providing the poor with a platform to actualize their own development agenda in their communities and becoming advocates for better local governance (FAO 2014).

6.2.3 Micro-Credit

Micro-credit is a method of lending very small sums to low-income individuals to start or expand a small business. Grameen Bank founded micro-credits in Bangladesh in 1983. Today there are several organizations that offer micro-credit adapted for the specific needs of farmers in Bangladesh, one of such organizations is BRAC.

BRAC works to empower people by providing them access to financial services in a way that is safe, accessible and convenient, with a special focus on women (BRAC 2019). BRAC's financial solutions aim at giving access to emergency cash at a preferential interest rate. BRAC has different services that provide loans that are tailor-made for agriculture workers looking to invest in farming and increase their yield (BRAC n.d.a). Here we describe three of those services:

- Seasonal loans are a special type of loan available only for farmers' issues related to farm work, such as assisting farmers who stop cultivation due to lack of capital, providing financial support to farmers who take high interest loans from money lenders and consequently do not get profit from their business, or to help farmers to stop selling crops to middlemen at low price because of low capital liquidity (BRAC n.d.a). Seasonal loans are customized loans for seasonal farmers. Bangladesh's six seasons allow farmers to harvest specific crops for each season. Seasonal loans provide farmers a convenient repayment scheme which allows them the flexibility to invest and start paying their installments with the provision of a two-month grace period (BRAC n.d.a).
- Borgachashi Unayyon Project (BCUP) is a project aimed at facilitating access to finance smallholder tenant farmers who do not own farming lands. Their loans allow farmers to invest in higher crop yields, adapt to new technologies, and invest in household labor supply. Alongside loans, BCUP provide market linkage services.
- Dabi micro-loans are used for small-income generating activities. Those micro-loans do not have to be invested in business, they can be used for consumption or to send children to schools; in those cases, micro-loans are an additional source of income. The average loan is of $ 412 paid back by weekly or monthly installments with an effective interest rate of 15%. Members who know new applicants will know if they are able to pay it off (BRAC 2019).

Given the described challenges regarding farmers having only limited cash-resources or when needed, a lack of access to cash, it seems that the BRAC's seasonal loans are the most appropriate ones. During our interactions with farmers in the F2F™ validation in 2019, some seemed interested in trying out BRAC's loans.

6.2.4 Producing Own Seed

Quality seed is the prerequisite for successful crop production, it increases jute yield by 15-20%; however, jute seed quality depends on the seed production method. Generally, jute seed crop is raised in two different methods: the traditional method and the improved method.

Table-12: Agronomic suitability of different methods of jute seed production

Agronomic parameters	Traditional method	Direct seeding	Top / stem cutting method	Transplanting Method
Land requirements	Land with fine tillage	Land with fine tillage	Land with fine tillage having available moisture	Land with fine tillage having high moisture
Optimum sowing time	April to May	Mid August to 1st week of September	Throughout the July	Mid August to September
Optimum seed rate	6-8 Kg/ ha	4-5 Kg/ha	It requires mother plants to collect top/stems	50-100 gm seed for a seed bed of (3x1)m^2 area
Field duration	About 240 days	About 120days	About 135 days	*About* 150 days
Infestation of pests and diseases	Very high	Very low	Very low	Low
Survivability	Medium	Higher	High	Medium

Source: Islam [7]

Figure 9. Comparison of the different seeding methods.

The traditional method requires the stems to be sown from April to May for 240 days in land with fine tillage. The direct seeding method requires stems to be sown between mid-August until the first week of September, the field duration is approximately 120 days. In the top stem cutting method seed are to be transplanted during July for about 135 days. The transplanting method requires stems to be sowed from mid-August to September for about 150 days in land with fine tillage and high moisture.

The traditional method of jute seed production alongside fibre crop was not profitable. It is also time consuming and prone to risks of infestation and diseases. To overcome the challenges related to production of high-quality jute seeds, Bangladesh Jute Research Institute (BJRI) came up with an improved technique for the production of quality seed.

Studies revealed that the direct seeding method is the easiest and most profitable among the four methods of jute seed production technology. Postponing production season of jute seed crop from early summer to late summer, during the month of July and August, provides higher seed yield. The direct seeding method requires to plant jute seed crops from mid-August to the first week of September, with medium high to high land with drained soil where rainwater or flood water did not accumulate. This avoids flooding during monsoon and precipitation during seed maturation. In Faridpur, jute seed crops can be planted until September 15th.

Planting seed crops in late summer provide three-four folds higher seed yield compared to the traditional method that requires planting seeds in early summer. Also, the direct

seeding method is the least time consuming compared to all presented methods. Lastly, the direct seeding method is less prone to risks of infestation of pests and diseases and has a higher survivability (Islam & Ali 2017; Mahbubul Islam & Uddin 2019).

6.2.5 Identifying High Quality Seed

Jute farmers lack the skills to identify the right quality seed and often farmers are disappointed with the plant population results. Consequently, they pay a premium price for low quality seed.

To get optimum plant population and desired yield, seeding rate was optimized and found that seeds having 80% viability, such as 5 kgha-1 of tossa jute, 7 kgha-1 of deshi and 12-15 kgha-1 of Kenaf and Mesta seeds, could offer the desired population and optimum yield. Jute seed of different qualities can be sown by adjusting the seed rate, even if they have 50% of viability. Proper seed rate is the main factor to obtain the desired plant population, growth of jute plant and maximum yield. Farmers can conduct a viability test of jute seed described below in order to determine seed viability and seed rate.

As previously mentioned, quality seed increase the production about 15% to 20%, but concerns over quality seed arise at the time of sowing crops every year. Therefore, it is very important to test the viability of the jute seed before sowing. Testing the viability of jute, kenaf and mesta seed is easy and cost efficient. One hundred seed with four replications are to be distributed on top of four bloating papers; the seed and bloating papers are to be kept moist throughout the test period by adding water. Seed that germinated will be counted and recorded daily for five days. A seed will be considered to have germinated if the seed coat ruptured and the radicle comes out up to 0.2 cm or more. Germination tests must be carried out at room temperature. If 80% or more seed have germinated, they can be considered as good quality seeds, but if 70% or less have germinated, they can be considered as low quality seed and should not be used for production purpose (Islam & Ali 2017).

6.2.6 One-Stop-Shop for Agricultural Inputs and Services

Farmers in Bangladesh need to buy the necessary agricultural inputs; however, smallholder farmers, especially in remote regions like Faridpur, lack access to such agricultural inputs (Quddus & Kropp 2020). This is particularly true for female farmers despite representing more than 50% of the country's agricultural workforce (IFC 2016; Kanya 2020)**.** Consequently, they visit informal intermediary market actors in order to get the necessary inputs. Here, those actors increase prices (CARE Bangladesh & The Daily Star 2020).

In order to remedy those challenges, CARE Bangladesh came up with Krishi Utsho (KU). KU is an emerging micro-franchise-based social enterprise started in 2012. Following M4P (Making Markets Work for the Poor) approach, KU acts as a one-stop solution centre for agricultural inputs and services for 63,000+ rural smallholder farmers,

especially women, through its network of rural agro-input shops. Local agricultural input shops are enlisted as KU franchises that sell products such as fertilizers, seeds, insecticide, tools for farming, etc. Shop owners are trained by KU to provide necessary and relevant advice to the farmers. By doing that, KU facilitates access to quality inputs and products as well as market information for farmers, and it also helps increase shop owners' incomes (CARE Bangladesh 2018).

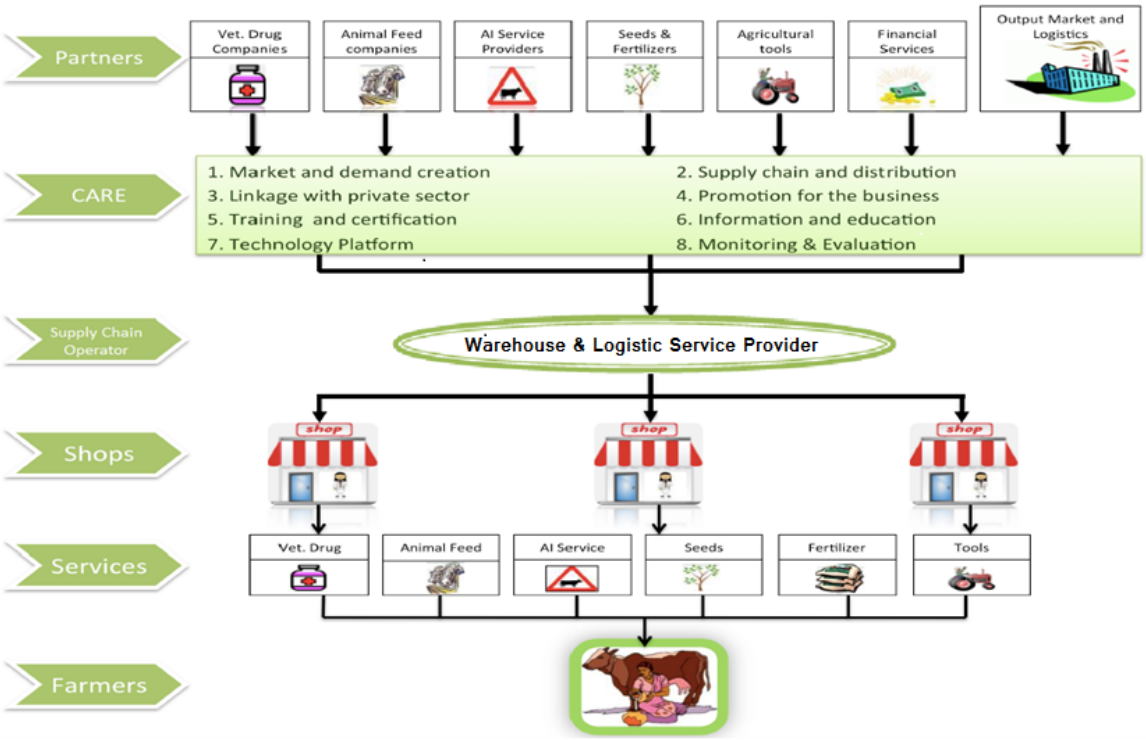


Figure 10. Krishi Utsho's Microfranchise Model. Source: CARE Bangladesh, 2019

KU firstly established a series of shops owned and operated by already embedded entrepreneurs, secondly it negotiated with key input providers to create dedicated and affordable products; thirdly, it linked farmers with key services; finally, it targeted farmers, especially women. Thanks to this, farmers spend 58% less time than they did accessing inputs; farmers' incomes increased by 31% as a result of higher production and quality; and women are 84% more likely to make household decisions (Azam & Janoch 2017; CARE Bangladesh n.d.).

6.2.7 Efficient Irrigation

Heavy rainfall or rain shortage during seed sowing and while the plants are a couple of weeks old highly impacts the young jute plants. One solution (that is practiced already), is to take advantage of the pre-monsoon shower during mid-March to mid-April, which offers optimum condition for land preparation and sowing. The jute will continue to grow when there is moderate and intermittent rain and shower during May and June, provided

that there is enough moisture in the soil. If pre-monsoon showers are not enough, an irrigation system might be needed (Islam, et al. 2017). Irrigation prevents farmers from losing their crops, although it incurs additional, usually unplanned, high costs. The workshop and survey showed that most farmers already apply the sowing and irrigation practices. The survey to jute farmers showed that about half already use irrigation systems.

6.2.8 Weather Forecast by SMS to Warn Against Weather Variation

Heavy rainfall or rain shortage mainly occur early in the season. Weather forecasts through SMS such as the ones provided by Krishi Sheba, are an additional solution.

Farmers get information and advice regarding 23 vegetable and staple crops, livestock, and fishery topics throughout their life cycles, in addition to weather forecast and technical support (like information regarding diseases). This is a subscription-based service, weekly, Tk3 is charged. Users receive two voice SMS per registered crop every week. Users can also make queries to the call centre which is hosted by agri-experts. A registered customer can call the agri-hotline for Tk 1/min. For non-subscribed customers, they can dial the agri-hotline without registration for a fee of Tk3/min.

6.2.9 Carbon-Rich Natural Fertilizers

As stated before, the cultivable lands of Bangladesh are highly deficient in organic matter. Therefore, compost is a great way to return organic matter to the soil in a safe manner. During land preparation, the land should be supplied with organic fertilizer before 2-3 weeks of seed sowing.

Using natural fertilizers coupled with low amounts of synthetic fertiliser (only when strictly needed) will avoid erosion of organic matter caused by synthetic fertilizers, leading to a long term solution.

6.2.10 Ribbon Retting Process

There are two types of retting processes: the traditional retting method or the ribbon retting (also called mechanical) method, as pictured below.

In ribbon retting, the ribbons are striped out mechanically from the stem before being coiled and immersed in water. The traditional retting process requires the entire plant stem to be immersed in water. Here, ribbon retting reduces retting time by 4-5 days. Additionally, the amount of water required for ribbon retting is almost half in comparison to traditional whole plant retting under normal conditions, which reduces environmental pollution (Banik et al. 2003).

Figure 11. Farmers putting the jute stems through a machine for the ribbon retting. Source: Youtube

Bangladesh jute Research Institute has done pilot projects with Ribbon Retting machines, and they also have a machine available for testing. During the workshop, farmers said that they had heard that ribbon retting with the machines damaged the fibres. Nevertheless, there are literature sources that point out that ribbon retting does not damage the quality and could even improve it in terms of fibre strength, colour, robustness and lusture (Rostom Ali et al. 2015; Banik et al. 2003).

Bashar, the CEO of Razzaque, mentioned during the F2F™ validation workshops, that he has previously worked with improving and adapting the output of machines, and is willing to test and try to improve the ribbon retting machine, even if it might be the case that the tested machines could damage the fibres.

The ribbon retting solution promises to tackle the environmental water challenges connected to traditional retting. It could also carry social and economic benefits, since the retting process increases productivity, and hence less reliance and costs connected to hiring temporary agricultural workers.

If the ribbon retting machine proves technically viable, a social analysis should follow since the machines are likely to change the dynamics of the retting process. Some of the questions that could be addressed in that analysis should be who would own and operate the machines, how would the ribbon retting work in practice, would it be practical for the farmers, would the farmers need to pay for ribbon retting, etc.

Additional potential solutions to deal with a (fresh) water shortage while retting:
1. Special plants placed in the retting ponds could be used for water treatment.
2. If the ribbon retting method is followed, a lot of jute can be retted in a small space, where less water is used in a more controlled manner. In such a case, there can be an option for the water to be recycled.

6.2.11 Direct Purchase with Digital Payment

Contract Farming (a term often used interchangeably with out-grower schemes) is an arrangement between a farmer and a buyer. Under this agreement the farmer agrees to

produce and sell a certain quantity of a commodity at a future date. This guarantees the farmer access to buyers and the buyer is guaranteed a reliable supply. This arrangement may guarantee prices between farmers and buyers. Often, the buyer will also provide the farmer with technical (e.g., training on how best to use inputs) and financial support (e.g., loans to support the purchase of inputs) (Farmer Income Lab 2018).

Direct Purchase is similar to Direct Contracting or Contract Farming, yet there are significant differences. The main purpose of the Direct Purchase is for the jute mill to purchase raw jute directly from the farmers without any intervention by the traders. The Direct Purchase consists of a Memorandum of Understanding (MoU) that specifies the conditions for quality, moisture, price, and payment method. Since the farmers are not yet organized under a formal scheme or cooperative, the MoU is signed by farmer representatives and includes an informal group of farmers that are registered in a database. These could individually sell their product to the jute mill directly. A farmer does not need to commit himself to 'provide a specific commodity in quantities and at quality standards determined by the purchaser'.

Direct Purchase was identified to be the most promising solution to increase the incomes of farmers by making the value chain more efficient and building a direct relationship between the jute mills and the jute farmers. Our assumption is, that if the traders were excluded, farmers would receive the full market price for the raw jute which will eventually increase the income of the farmers. Having a direct relationship between the farmers and the jute mills, has the additional benefits of addressing down-stream challenges effectively and reducing inefficiencies in the value chain.

The Digital Payment is connected to the Direct Purchase solution presented. Digital Payment is needed as farmers asked the jute mill (Razzaque) to pay them instantly, as opposed to being paid in credit which is normal practice with traders.

In the F2F™ Validation workshops in 2019, stakeholders proposed the Digital Payment solution to allow instant payments, facilitate transactions and to give access to information to farmers. This could be done through the digital financial service Nagad, that allows users to cash in and cash out, and to send money and top-up without a bank account. Farmers can then receive instant payments and are able to keep track of transactions. Thereby, they can also get access to formal loans.

6.2.12 Fair Pricing Arrangements

Pricing arrangements can take various forms, but they generally involve a guaranteed minimum price set by the government or negotiated by representatives of producers, and premiums for meeting quality and other standards. Those interventions are referred to as public and public-private pricing arrangements. Public interventions are cases where governments set legally binding price restrictions or regulations. Public-private interventions are cases in which marketing boards or other professional organizations comprised of representatives of the private sector are consulted in setting price levels.

The aim of such arrangements is to protect producers from price volatility and to ensure that profit margins are fairly distributed among the different actors in the value chain.

Category 5: Interventions that did not show significant income increases	Evidence demonstrates these interventions deliver income improvements less than 10%, though they are highly scalable and could be part of a broader approach	Pricing arrangements	Low	High	Low	Low
		Input subsidies				

Figure 12. Farmer to Factory Jute Supply Chain™ solutions that did not show significant income increases.

This table shows that the impacts of pricing arrangements and input subsidies were limited as income increased by less than 10%. These agreements however were widely adopted by more than 5 000 beneficiaries that were directly and indirectly part of the program. There is evidence of increased income up to two years after the end of the intervention. Due to its limited positive impact, it is better for this solution to be implemented as part of a wider initiative that will have a larger positive impact.

6.2.13 Certification

Certification is a process in which a third party monitors and validates the compliance of farmers with a set of voluntary standards. Buyers and suppliers then recognize 'certified' farmers as a preferred source of higher quality and/or compliant raw material that meets an agreed-upon specification to receive premium payment. Farmers who participate may also receive technical training and other support to help them meet the certification standards.

Amfori BSCI and BEPI

Amfori has developed two tools to support companies to improving social and environmental performance in their supply chain. Amfori's tools follow a system for improvement and management, the social tool is compatible with SA8000 Social Management Certification.

- BSCI for social principles and BEPI for environmental principles.
- Not a certification, but a system for improvement and management plan: Do - Check – Act.
- BSCI is compatible with SA8000 Social Management Certification.
- Supporting companies to improving social and environmental performance in their supply chain.
- Provides tools for companies to self-monitor and evaluate and to log supply chain performance information. It also visualizes complex supply chains viewed through a sustainability lens.
- Provides training coaching and practical advice.
- No product focus, traceability not assured, no labels.

ISCC Plus

The International Sustainability & Carbon Certification (ISCC) is an international certification system covering all kinds of bio-based feedstocks and renewables catering to energy, food, feed, and chemicals sectors. It incorporates sustainability criteria such as reduction of greenhouse gas emissions, sustainable use of land, protection of natural biospheres and social sustainability. ISCC is a member of the UN Global Compact and supports other major international initiatives advocating sustainable supply chains.

- Certifies at farm or point of origin.
- Supply chain traceability is ensured.
- Covers social, environmental, and economic sustainability.
- There are specific approaches to help smallholders.
- 7 certification add-on Ex. ‘Greenhouse Gas Emissions’.
- ISCC logo on product for marketing/labelling. B2B claims also possible.
- A living wage that meets at least legal or industrial minimum standard.

Forest Stewardship Council

The FSC's stated mission is to "promote environmentally appropriate, socially beneficial and economically viable management of the world's forests". It claims that forests managed to its standards offer benefits to both local and wider communities and these are said to include cleaner air and water, and a contribution to mitigating the effects of climate change.

Directly or indirectly, FSC addresses issues such as illegal logging, deforestation and global warming and some reports indicate positive effects on economic development, environmental conservation, poverty alleviation and social and political empowerment.

- Compliance with laws.
- Workers’ Rights and Employment conditions.
- Indigenous People’s Rights.
- Community Relations.
- Benefits from the Forest.
- Environmental Values and Impacts.
- Management Planning.
- Monitoring and Assessment.
- High Conservation Values.
- Implementation of Management Activities.

	Environmental Impacts	Workers' Rights	Indigenous rights	Traceability	Certifications	Flexibility of Requirements
Amfori BSCI	Yes	Yes	N/A	N/A	N/A*	N/A
ISCC Plus	Yes	Yes	Yes	Yes	Yes	N/A**
FSC	Yes	Yes	Yes	N/A	Yes	Yes***

Table 7. Different Certifications and their focus areas.

* BSCI does not offer certification, companies that fulfil BSCI's requirements and wish to be certified need to apply to the SA8000.

** ISCC Plus has strict requirements encompassed within the previously mentioned requirements, such as access to quality primary education or medical care provisions.

*** The FSC Certification is the only one that states explicitly that they allow flexibility concerning the fulfilment of requirements due to changes in cultural, economic, or ecological context.

Roundtable of Sustainable Biomaterials

Roundtable of Sustainable Biomaterials (RSB) is a multi-stakeholder roundtable initiative which is applicable without geographical or commodity limitations. On January 1, 2013, the RSB formally became an autonomous non-profit organisation based in Geneva, Switzerland, and changed its name to "Roundtable on Sustainable Biomaterials" on 18 March. The RSB EU RED standard is part of the overall scheme.

- RSB is the only standard which requires 100% farm certification based on the EU RED standard.
- RSB requires reductions in GHG emissions that exceed the current EU RED threshold.
- Total compliance with the requirements regarding accreditation, audit frequency and sampling as well as sanction mechanisms.
- The standard clearly requires conducting proactive stakeholder consultations during audits.
- A social and environmental management system is required.
- The standard requires that the management system incorporate a social and environmental impact assessment.

6.2.14 Traceability

When farmers are selling directly to the jute mill, traceability can easier be ensured. No trader is included in the value chain of the F2F™ Model. This solution facilitates the sustainability traceability and certification of the value chain. If we can successfully manage the jute collection part directly from the farmers, it is easier for us to track the traceability part of the jute crop, thus helping us tremendously to get our jute certified for

the JutePP®™ production, which is our major concern right now. The jute certification would be the very first of its kind as far as we know.

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