



INCREASING QUALITY IN MUNGBEAN PRODUCTION OF SMALL FARMERS

FINAL REPORT

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Addressed to:

Blue Gold Program - Innovation Fund
Karim Manjil, Ground Floor,
House 19, Road 118
Gulshan, Dhaka 1212



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For more information on this pilot please contact us:
Nadia Firoz, Chief Sustainability Officer
nadia@justfarmingbd.com

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BLUE GOLD PROGRAM

The Blue Gold Program is a collaboration program between the Government of the Netherlands (donor) and the Government of Bangladesh. The program is implemented by the Ministry of Water Resources, through the Bangladesh Water Development Board (BWDB, lead agency) and the Department of Agricultural Extension (DAE). The objective of the program is to reduce poverty for households living in selected coastal polders by creating a healthy living environment and sustainable socio-economic development. For more info visit: <http://www.bluegoldbd.org/>.



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EXECUTIVE SUMMARY

The market for mungbean in Bangladesh is valued at \$28 million. Even though mungbean production has experienced a growth of 5 percent since 2007–08, demand exceeds local supply, resulting in high levels of imports. There was a common interest by Just Farming to tap into this opportunity and the Blue Gold Program to support the mungbean farmers in Pathuakali that have been part of the program. The project intended to address two major challenges in this value chain: 1) quality of produced mungbean is low and 2) volumes of farmers are not high enough. The proposed solution to address these challenges was to set-up a Production Hub with an IT-system to support production management and quality control.

The project has had the following impact:

- 200 small-scale mungbean producers have signed contract agreements with Just Farming. The farmers have received quality inputs (through linkage to input sellers), training on improved and efficient production and post-production practices. They were also provided with a guarantee of purchase.
- Four groups were able to harvest, consisting of 100 farmers. These 100 farmers harvested a total 21.79MT with an average of 217.91 kilogram per farmer. The 21.79 MT mungbean was sold to Just Farming at an average price of BDT 76 per kilogram. This is an increase in their income compared to last year when the sale price averaged around BDT 62 per kilogram. The other 100 farmers lost their crop due to unfavorable weather conditions.
- While Just Farming could not establish a full relationship with premium clients, a small margin from selling the mungbean to local arotdars was made. The mungbean was sold to local arotdars at an average price of BDT77/kg. This gave Just Farming a margin of BDT 1 per kilogram.
- The farmers who sold their harvest to Just Farming had an average earning of BDT 16,606 per farmer. The 200 farmers together invested a total of BDT 670,032, incurring an average cost of BDT 3,350 per farmer. This resulted in an average profit of the mungbean season of BDT 13,256 for the farmers that could harvest.

The IT-system, Farmforce has been helpful during the management of production. A clear guideline is build in to ensure farmers receive the same advice. It also unlocks a lot of data that allows management of production based on data-drive decisions. The insight into the adoption of recommendations and cost will be helpful in the planning of future seasons and as feedback for farmers. The system has a few key disadvantages: the standard reports in the system are limited and farmers have no access to the data in the system. Alternatives are being researched to address these concerns.

Setting up a contract farming system with the farmers did not result in the expected adoption of production practices that had been seen in other crops Just Farming cultivates. The use of Just Farming's intent to buy back as an incentive to adopt the recommended practices was not strong enough to counter concerns of losing the harvest completely. A long-term partnership with farmers is needed where gradually more farmers will adopt the recommendations.

The biggest challenge has been to enter the premium market segment for mungbean. Three issues have been identified that played a major role: 1) Clients look for proven track records, 2) Clients look for processed mungbean, 3) Clients look for year round supply. This has resulted in a major adjustment of the value proposition Just Farming offers to clients. The inclusion of storage can both support year-round supply and increase credibility with prospects. Creating an opportunity for storage is the big priority for next season to ensure that the revised value proposition can be delivered to the contacts made during this initial season.

INTRODUCTION

The market for mungbean in Bangladesh is valued at \$28 million. Even though mungbean production has experienced a growth of 5 percent since 2007–08, demand exceeds local supply, resulting in high levels of imports. This has created an interesting marketing opportunity for Just Farming. Just Farming manages agricultural supply chains to ensure high volumes of high quality, traceable agricultural produce by engaging intensely with small-scale farmers. The company already produced potato and mango and is adding mungbean as a third crop in its portfolio.

The Government of Bangladesh (GOB) has been actively promoting the production of pulses, pledging to increase the mungbean cultivation area with 9.7 percent by 2030. About two-thirds of Bangladesh’s pulses are cultivated in the Southwest region, involving 575,000 smallholder farmers. This makes mungbean a crop of interest for the Blue Gold Program that is active in Pathuakali, one of the major production areas. The Blue Gold Program has organized Market-oriented Farmer Field Schools to encourage production of the crop but since farmers do not see mungbean as an important commercial crop, adoption of new technology and practices was limited. Access to a premium market segment could potentially improve this adoption and increase income for farmers. These trained farmers provided Just Farming with a good base to set-up production.

However, despite a very promising market for mungbean in Bangladesh, certain constraints at both ends of the spectrum inhibit the realization of its full potential. The Blue Gold Program and Just Farming set-up this project that intended to address two major challenges in this value chain (quoted from the original proposal):

“Institutional buyers demand high-quality products, that are often challenging for them to source. Initial discussions with PRAN, BD foods and Amrito reveal that they face difficulty in sourcing mungbean of the right size and shape. In addition, the mungbean they procure from their existing suppliers come in mixed sizes and are not sorted or graded. The product is also not very clean at most times.”

Challenge 1

“Institutional buyers like PRAN and ACI require consistent supply of mungbean in high volume in order to ensure a smooth production line and market availability. However, this becomes a major constraint for buyers to manage. Low levels of cooperation among actors exist out of fragmented communication and transport channels.”

Challenge 2

The proposed solution to address these challenges was to set-up a Production Hub with an IT-system to support production management and quality control. The operational model is visualized in figure 1. This report will focus on the work done by Just Farming and analyze which parts of the intervention were successful and which parts were not. The first chapter provides a general overview of the project and what has been organized. The second chapter looks more closely at the benefits and challenges of using the IT-system, Farmforce. After this, the fourth chapter is dedicated to analyzing the efforts around Marketing & Branding. The next two chapters look at the impact on farmer level and challenges faced during the project. The final chapter looks at the next steps Just Farming is taking for next season.

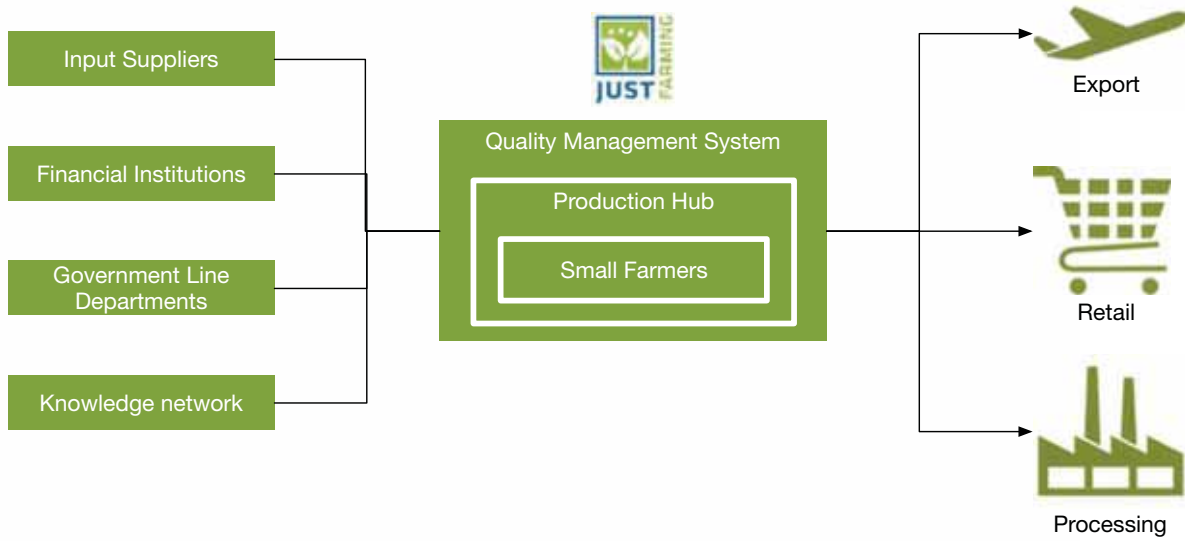


Figure 1: Operational model Just Farming

1. PROJECT OVERVIEW

The project as originally designed in the proposal had three key phases: 1) the set-up of the quality management system, 2) the set-up of the production hub and 3) branding & marketing. This chapter gives a basic overview of what has happened in each phase.

Phase 1: Set-up of Quality Management System (QMS)

Managing hundreds of farmers directly with extension staff is challenging. That's why an IT-management system became part of the production hub. The basic objective was to ensure farmers follow the same process and grow high-quality products. Farmforce, developed by Syngenta Foundation, formed the core of the QMS. In the initial stage, the crop calendar was identified, detailing what specific steps to follow and what doses of chemicals to apply for each stage of the production process. This aided the production officer in maintaining consistency and quality during training sessions and when providing advice to farmers. Just Farming staff was trained on the use of the system by Farmforce staff. The system also allowed the Just Farming head-office to track production related activities. Although great to follow-up on individual farmers, the standard reports the system generates have been disappointing (see chapter 2 for more details). At the same time, data from the system were utilized to engage in further discussion with farmers to improve on any gaps that had been identified.

Phase 2: The Production Hub

Just Farming set-up a Production Hub located in Patuakhali Sadar Upazilla, Patuakhali. The objective of the Production Hub is to manage production of 200 smallholders and ensure high quality, safe products. Farmers were selected through the Market-oriented Farmer Field Schools that the Blue Gold Program had organized the previous seasons. Farmers from outside these groups were included to ensure the Production Hub could be managed efficiently. The mungbean variety that was planted is Bari 6. Just Farming staff manages the hub and provided training at key moments in the season. Production is followed up bi-weekly.

Regular capacity building training by Just Farming was the main activity of the production hub. The project staff pulled knowledge and information from key stakeholders like government departments, input companies and local agriculturalists and combined/aligned them all into one document in a mungbean production guideline. Farmer Guidelines for mungbean production were printed, with an ideal crop calendar specific to that region based on the experience of the Blue Gold Program. The crop calendar was fed into Farmforce. This was based on extensive desk research and consultation with key stakeholders and technical experts in the sector. Instructions in the guidelines were followed strictly during training to ensure consistency of messaging. Farmers were required to follow all instructions and maintain strict quality standards as prescribed by the production officer. Based on the guideline the production officers organized regular training sessions for the eight groups of small-scale mungbean producers. Farmers were provided with specific short duration trainings on each major stage of production. This was then followed up with bi-weekly inspections to make sure the farmers actually implemented what they were taught during the training sessions. At the time of sowing, farmers were taught to follow the line sowing method. They were also taught on how to do weeding and apply irrigation for mungeban production. They were then instructed to apply inoculum 7 gram per decimal 7 days since planting. They were also instructed to apply fungicides and insecticides at various intervals during the production process, provided insects were present. Each of these short duration trainings were followed up by production officer to identify gaps and improve on it. Once harvest was in, we trained farmers to carefully undertake an initial round of drying and sorting, which was previously not in practice.

Even after all the intensive training and close monitoring, we found that most farmers did not follow some basic instruction such as line sowing method. We realized none of the farmers treat mungeban as their

main crop, and hence they do not give too much attention or care to its production process. However, around 8% of farmers did follow the instruction and all saw benefits from line sowing. Farmers who used this method incurred no extra labour cost for weeding and the beans were of good quality and standard size of 3.55 mm. This eventually fetched them a better price. This experience was shared by several farmers during the Innovation Fun manager's visit to the project. There is now a lot of willingness among farmers to adopt line sowing, which Just Farming will actively follow up on in the upcoming season, expecting a significant increase in the uptake of this method.

Through the production hub, mungbean producers were linked to two select input sellers in the locality. All these input sellers provided good quality pesticides and insecticides to the 200 farmers associated with the project. At the same time, they also gave a good discount to the farmers since they purchased in bulk. This was a good business deal for the input seller and beneficial for the farmers as clients. At the same time, the input seller attended training sessions on proper application methods of pesticides and insecticides including Cought 10 EC and Tilt 250 EC and demonstrated how to apply them effectively and mentioned the proper doses for these to work. The input seller's presence added value to these trainings and was very well received by farmers, who said they have learned many important and new tips on proper usage of various inputs. Those who followed the instructions properly, reported on being able to reduce their overall production cost and in some cases, improved yield.

The project team has built a good relationship with DAE and the production officer visited the local government office regularly and kept them updated on the project activities. DAE extension officer attended a few farmer training sessions also and were appreciative of our overall approach. He took specific sessions on importance of line sowing and use of inoculum. Farmers were happy to learn from him and appreciated the opportunity as they hardly got access to extension officers prior to this. The extension officer also expressed his satisfaction at being able to reach so many farmers at once as it is usually difficult for him to visit door to door. Farmers who applied inoculum reported on seeing many benefits including no need for urea, greener leaves, increased flowering, bigger size beans and less prone to attack by mosaic virus. This again motivated others to apply inoculum in the upcoming season.

Phase 3: Branding & Marketing

Just Farming had several rounds of fruitful meetings with ACI, the most important lead at the start of the project. They had expressed interest to initiate a long-term partnership, whereby ACI Agrolink will procure premium quality mungbean from Just Farming. In the end the relationship did not materialize and neither did other contacts with prospects.

Because it was impossible to sell in the initial target market, the mungbean procured from farmers has been sold off to local arotdars with a small margin for Just Farming. Although not ideal, it has been a difficult lesson that this is likely the first step for all products that are being cultivated. Getting the volume, quality and post-harvest processing tested during a first season is essential to have a believable story for prospects. Everyone loved the model but needs to see it work in practice. Chapter three has an analysis of the reasons behind the challenges with branding & marketing and the lessons learned in more detail.

2. QUALITY MANAGEMENT SYSTEM

Farmforce is a Software-as-a-Service solution that simplifies the management of small-holder farmers, increases traceability and enables access to formal markets. It is used to efficiently manage outgrower schemes and contract farming programs. Farmforce is of particular relevance in developing countries where smallholder farming is prevalent. The software has been developed by Syngenta and operates as a spin-off. Farmforce forms the core of Just Farming's Quality Management System.

Farmforce forms the core of Just Farming's Quality Management System. Although not as easy to use as expected, see the last paragraph of this chapter, it has provided a lot of information to support improved production for next season. This chapter outlines some of the key functionality used and how information is analyzed to provide a clear action plan for next season.

Growing Management

Farmforce allowed organized planting campaigns for mungbean production hub by offering options to view planting details of each field and the combined total acreage of the campaign as well as allow farmer locations to be spotted on the map in one view (see figure 2).



Figure 2: Field locations

Within Farmforce a crop calendar for mungbean has been defined (see figure 3), basically a step by step guide on what to do when during the cultivation. This allowed the production officer to convey a detailed and consistent message during training sessions at each stage of production. Based on the crop calendar, details of growing activities of each farmer were entered in the system. This includes time of seed sowing, fertilizer application, pesticide application and weeding. This data allows us to analyze how many farmers have followed up on recommendations. An overview of the data for the current production season is provided in table 1.

As can be clearly seen from the details, the more expensive recommendations to apply fungicide / insecticide are not followed by most farmers. With 100 farmers losing their harvest at the end of the season, this is not a surprise. The assumption in the original proposal that farmers would be more willing to invest with a guaranteed market is not true for mungbean.



Figure 3: Part of the mungbean crop calendar

Activity	Followed exactly	More than recommendation	Less than recommendation	Not applied
Land Preparation: Tractor use on 1 st day	200			
Land Preparation: Tractor use for a second time on 1 st day	200			
Land Preparation: Tractor use on 3 rd day	51			149
Land Preparation: Tractor use on 5 th day	0			200
Seed sowing	149	12	1	38
Inoculum	6	3	28	163
Seed Sterilization: Naczeb 80 WP	21	0	0	179
Fungicide spray:Tilt 250 EC	26		0	173
Day: 27		1		
Weeding		Not tracked		
Irrigation: Day 38	0	0	0	200
Fungicide spray:Tilt 250 EC	88	0	7	105
Day: 39				
Insecticide Spray:Cought 10 EC	2	3	1	194
Day: 40				
Insecticide Spray:Admayer 20SL		0	0	182
Day: 40	18			
Insecticide Spray:Cought 10 EC	11	0	0	189
Day: 50				
Insecticide Spray:Admayer 20SL	32	1	1	166
Day: 50				
Insecticide Spray:Cought 10 EC	11	1	0	188
Day: 60				
Insecticide Spray:Admayer 20SL	83	3	1	113
Day: 60				

Table 1: Overview of recommendations followed

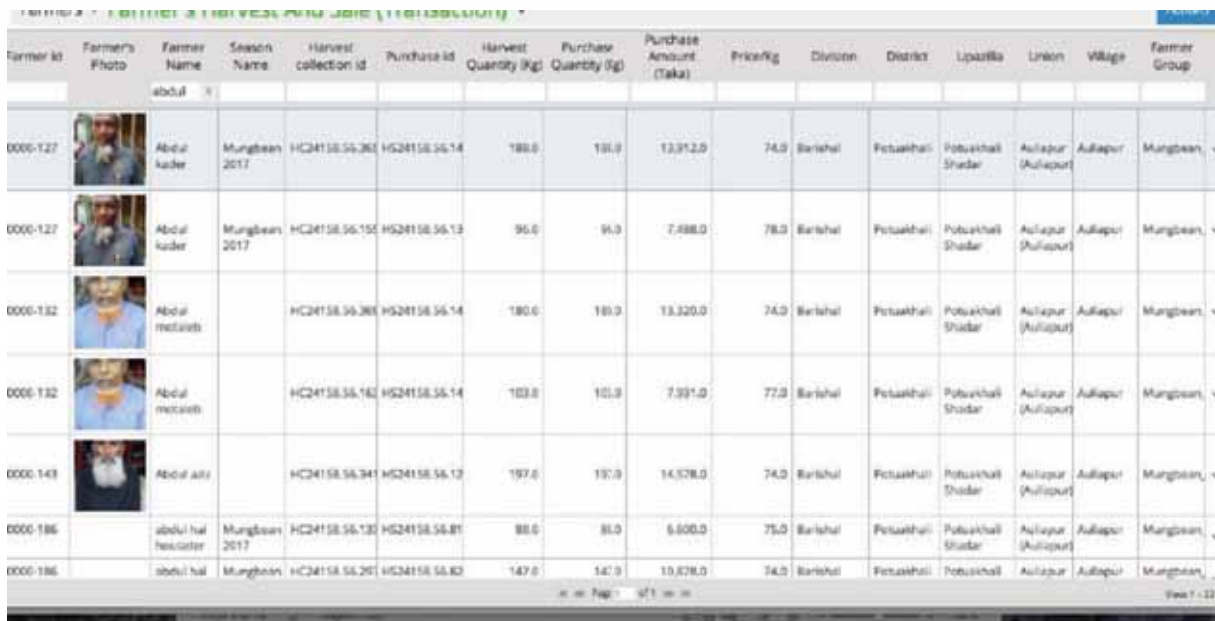
This is a distinct difference between mungbean and other crops Just Farming cultivates like mango and potato. These are considered as important, commercial crops and mungbean has a different status.

Farmers who did apply new technology reported satisfactory results. Among those were a reduced use urea, the leaves are greener, increased flowering and bigger sized beans. Seed sterilization, on the other hand, was seen to have acted as a good preventive measure against pest attack. Farmforce allows us to see which farmers have adopted the technology with good results and these farmers can support training sessions in the following season.

One of the other lessons learned is that the crop calendar was too intensive and some steps were not necessary. For instance, we found that none of the farmers actually irrigated because there was no need for it this season. Most farmers did not use a tractor more than two times since there is no real need for over ploughing. Those who did not apply insecticides did not need to as their crop was not badly affected by insects. These lessons allow the crop calendar to be adapted for next season and should increase efficiency in the production.

Harvest

The system allowed the production officer to record harvest amounts and sales. This means that there are records of what each farmer sold and how much they have been paid (see figure). A total of 100 farmers harvested a total of 21.79MT with an average of 217KG per farmer. They sold their harvest at an average price of BDT 76/kg. The crops of the other farmers were completely destroyed due to heavy rainfall.










Farmer id	Farmer's Photo	Farmer Name	Season	Harvest collection id	Purchase id	Harvest Quantity (kg)	Purchase Quantity (kg)	Purchase Amount (Taka)	Price/kg	Division	District	Upazilla	Union	Village	Farmer Group
0000-127		Abdul kader	Mungbean 2017	HC24158.56.361	HS24158.56.14	180.0	180.0	13,912.0	74.0	Barishal	Potaekhali	Potaekhali Shadar	Aulapur (Aulapur)	Aulapur	Mungbean
0000-127		Abdul kader	Mungbean 2017	HC24158.56.150	HS24158.56.13	96.0	96.0	7,888.0	78.0	Barishal	Potaekhali	Potaekhali Shadar	Aulapur (Aulapur)	Aulapur	Mungbean
0000-132		Abdul mekateb		HC24158.56.361	HS24158.56.14	180.0	180.0	13,320.0	74.0	Barishal	Potaekhali	Potaekhali Shadar	Aulapur (Aulapur)	Aulapur	Mungbean
0000-132		Abdul mekateb		HC24158.56.162	HS24158.56.14	103.0	103.0	7,991.0	77.0	Barishal	Potaekhali	Potaekhali Shadar	Aulapur (Aulapur)	Aulapur	Mungbean
0000-143		Abdul alih		HC24158.56.341	HS24158.56.12	197.0	197.0	14,578.0	74.0	Barishal	Potaekhali	Potaekhali Shadar	Aulapur (Aulapur)	Aulapur	Mungbean
0000-186		abdul hal hussain	Mungbean 2017	HC24158.56.130	HS24158.56.81	88.0	88.0	6,600.0	75.0	Barishal	Potaekhali	Potaekhali Shadar	Aulapur (Aulapur)	Aulapur	Mungbean
0000-186		abdul hal hussain	Mungbean	HC24158.56.201	HS24158.56.82	147.0	147.0	10,878.0	74.0	Barishal	Potaekhali	Potaekhali Shadar	Aulapur (Aulapur)	Aulapur	Mungbean

Figure 4: Harvest & sales records

Based on this data it is also possible to do an analysis on the yield of each farmer. These differences, together with the information from the crop calendar, will help identify local lead farmers so learning from each other can be encouraged. At the moment of writing this report, this analysis has not yet been completed.

Understanding cost

The system also allowed tracking costs for farming inputs, including pesticides, fungicides, fertilizer etc. based on standard cost in the system. A production cost breakdown for each farmer within the Production Hub is possible (see figure 5). The average land size cultivated per farmer is 143 decimal and the average cost per farmer stands at BDT 3,350. Those farmers that followed our recommendations incurred a cost between BDT 2000-2500.



Figure 5: Production cost per farmer

Learning sessions

During group sessions, the production officer has discussed these data with the farmers involved. Within each group, production officers pointed out 4-5 farmers who followed instructions of line sowing and followed proper doses of input application. These farmers took turns to explain how this has led to decreased costs and improved yield and quality produce. This prompted other farmers to express their intent to follow line sowing and apply only recommended doses of inputs in the upcoming season. It also promotes healthy competition and benchmarking within and across groups. To encourage line sowing, collaboration will be sought in upcoming seasons with organisations promoting PTOS, reducing labour costs and making adoption more likely.

The positive results from the fields of a few early adopters led to a lot of openness and willingness among others to follow recommended practices such as line sowing, seed sterilization and inoculum application in the upcoming seasons. At the same time, we learnt of the importance of providing direct access to the software/information bank and use of data at farmer end. While these sessions helped farmers compete with peers, they are still to understand the full benefits. Once farmers have access to the interface, they are more likely to share, learn from each other and go on to improve their overall production planning and process. Once they maintain records themselves, they can understand their profits and margins from sales and can plan their business better. This is one of the major challenges in the use of Farmforce since access

is limited to Just Farming staff.

Evaluation Farmforce

Although Farmforce unlocks a lot of data that allows management of production based on data-drive decisions, the system has a few key disadvantages. The two major issues are that the standard reports in the system are limited and that farmers have no access to the data in the system. To generate the report in table 1, Just Farming had to coordinate directly with the Farmforce office in Thailand. This costs time and is not sustainable in the long-term if multiple products at multiple locations are produced. A summary of benefits and disadvantages is included in the table below.

Benefits	Challenges
Huge storehouse of information and intelligence	Does not provide direct access to farmers
Allows delivery of consistent messaging	Web display not as appealing
Helps monitoring of activities at each stage of production	Field staff/mobile users cannot rectify a mistake
Helps check status and progress of each farm and field	Mapping and data entry takes a lot of time.
Provides alerts when someone is overusing or under-applying recommended doses of inputs	Maximum 4-5 can be mapped in one day with the existing staff
Helps ensure traceability	Too many options (e.g. chemical use for other crops) appear on screen making it confusing and time consuming.
User friendly for mobile users	Some necessary reporting options are not inbuilt in the system
Easy to track production costs	
Easy to track harvest and sales	
Works as a good pitch to prospective clients	
Very good support service from Farmforce team	

Table 2: Benefits and challenges of Farmforce

Some of the challenges indicated are not related to the system but to the use (time consumption, many options). Getting used to working based on an IT-system has been a challenge and requires behavioral change from Just Farming staff as well. Just Farming is reviewing the full requirements of the system and looking at alternative systems that have the benefits of Farmforce but also addresses some of the concerns around user friendliness, reports and access for farmers. The overall experience of using the system has been positive and an IT-system will remain at the core of the production and quality management in the Production Hub.

3. MARKETING AND BRANDING

The value proposition in the original proposal was based on the challenges currently faced by the target group. The Value Proposition and rationale for it are visualized in figure 6. The initial value proposition was based on the premise that farmers could not deliver the right quality mungbean for customers in the sector, either because they delivered a low volume or because the quality was not upto industry standards. The assumption was that if Just Farming could deliver this, customers would be willing to enter into long-term relationships.

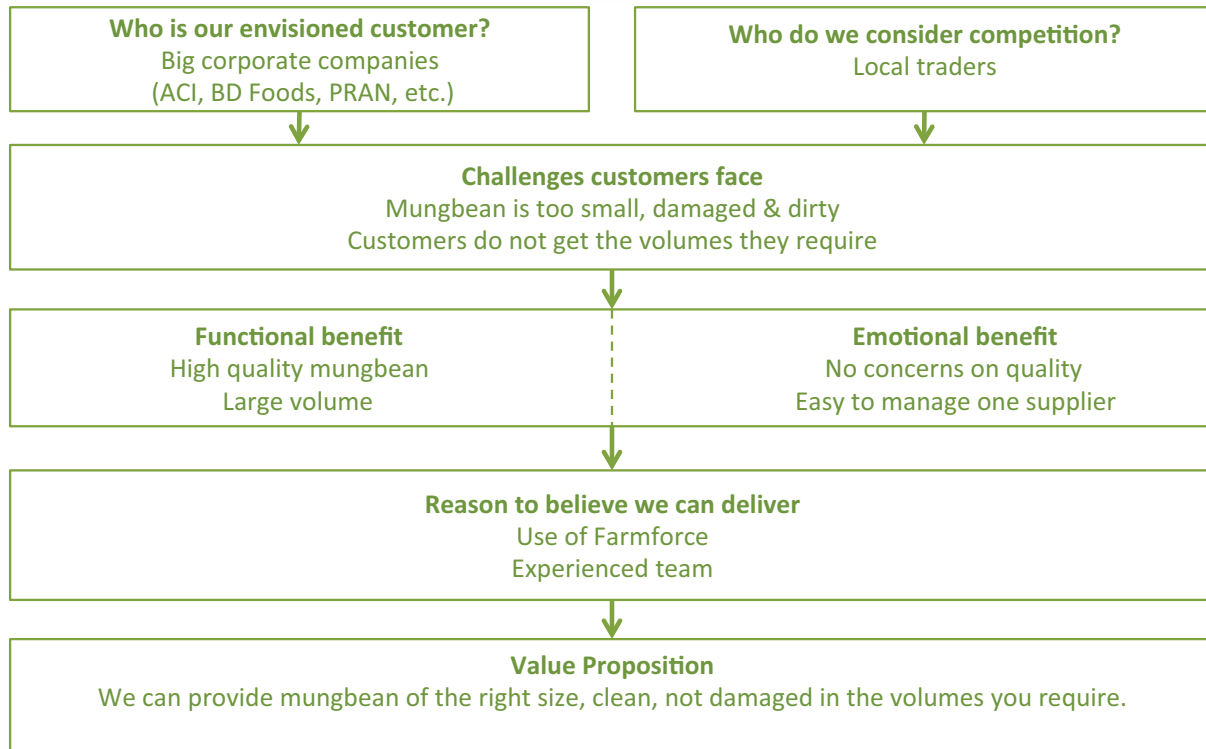


Figure 6: Assumed Value Proposition before project

Based on conversations with ACI, traders, processors and exporters, a few key assumptions in this model have proven to be wrong, which resulted in a struggle to market the mungbean in premium markets and make the pilot commercially successful in the first season:

- *Clients look for proven track records:* Convincing clients that Just Farming can deliver on promises has been a struggle. The company is producing a limited number of products and just finished the first harvest. This meant that it was impossible to show sample products to potential clients, making it difficult to prove the promised quality would be delivered.
- *Clients look for processed mungbean:* Delivering the mungbean straight from the field is not interesting for most clients. They are interested in processed, ready to use, mungbean. This means buyers specify size, shape and colour standards that can only be ensured after sending them to mills with modern and automated machineries. Setting up a relationship with a reliable miller to get this done was not possible in this season.
- *Clients look for year round supply:* Instead of a large volume during the harvest period, clients indicated that their main issue is supply after the harvest period. For smaller processors and exporters it is often not possible to purchase required quantities later in the year. Since no storage was built for the mungbean, it was not possible to fulfill this demand.

These challenges have resulted in an evaluation of the value proposition and product Just Farming wants to offer to clients. A revised version of the model is shown in figure 7. Important changes have been marked red to emphasize shifting priorities in becoming a profitable actor in the mungbean sector. These changes mark a move from focusing on production related issues to providing value added services post-harvest.

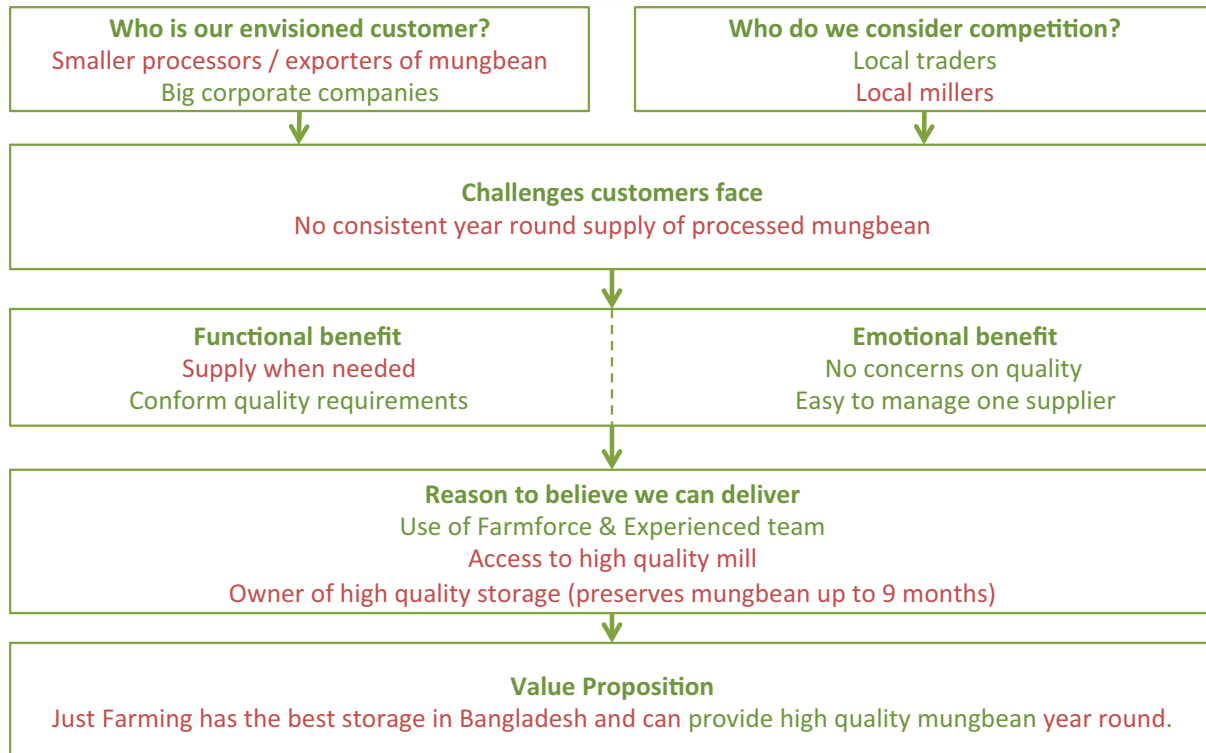


Figure 7: Revised Value Proposition

Since fulfilling the actual requirements of customers was not possible this season, Just Farming made an arrangement with an arotdar to procure the mungbean with a commission of BDT 1 per KG for Just Farming. The full production of 21.79 MT mungbean has been sold with an average price of BDT 76/kg.

The first issue has been a challenge for the company in other products grown as well. Both with mango and potato, it has been a struggle to prove that Just Farming can deliver on our promises. For mungbean the implication is that the most likely first adopters are not the big corporates originally envisioned but smaller companies requiring mungbean when their traditional supplier can not provide it. Quality control of production remains key to ensuring Just Farming can deliver the quality it promised, but it will also need to include work post-harvest to ensure the customer's challenges can be solved.

For mango and potato our original value proposition also changed after the experiences of the first harvest season. In the case of mangoes for example, it is more important for corporate buyers that mangoes are spotless than guaranteed safe to eat. Based on the struggles with defining the right value proposition, and thus convincing clients to enter into long-term relationships, an extensive customer survey is planned with exporters and processors to ensure the findings presented in this chapter are representative of the sector. The results of this customer survey are expected to support a business and investment plan for future seasons.

4. IMPACT ON MUNGBEAN FARMERS

The small-scale farmers benefitted in several ways as a result of working with Just Farming and the Blue Gold Program in this project. It is important to understand the difference between short-term and long-term impact. The first season was impacted by wrong assumptions in the value proposition and the weather. Just Farming expects to build on the results of the first season and increase them in the seasons to come.

Key short-term benefits and impacts are summarized below:

- 200 small-scale mungbean producers have signed contract agreements with Just Farming. The farmers have received quality inputs (through linkage to input sellers), training on improved and efficient production and post-production practices. They were also provided with a guarantee of purchase.
- The learning sessions organized on the basis of Farmforce findings helped farmers compare with peers and helped them improve accordingly. All their records are available for their reference. The system also records cost of input and costs involved at every stage. So, farmers have been made aware about their full production costs in the season. They can understand their profits and margins from sales and can plan their business better.
- The four groups that were able to harvest, consisting of 100 farmers, in total, did lose a lot of their crops as well. These 100 farmers harvested a total 21.79MT with an average of 217.91 kilogram per farmer.
- The 21.79 MT mungbean was sold to Just Farming at an average price of BDT 76 per kilogram. This is an increase in their income compared to last year when the sale price averaged around BDT 62 per kilogram. The increase in sales price is partly due to limited supply this season. However, part of it should be credited to improved quality of the mungbean.
- While Just Farming could not establish a full relationship with premium clients, a small margin from selling the mungbean to local arotdars was made. The mungbean was sold to local arotdars at an average price of BDT77/kg. This gave Just Farming a margin of BDT 1 per kilogram.
- The farmers who sold their harvest to Just Farming had an average earning of BDT 16,606 per farmer. The 200 farmers together invested a total of BDT 670,032, incurring an average cost of BDT 3,350 per farmer. This resulted in an average profit of the mungbean season of BDT 13,256 for the farmers that could harvest.

In the long-term the yield gap between the average production in Bangladesh and these farmers needs to be closed for the relationship to be mutually successful. If this happens, it can be expected that over time, and with major challenges like the weather addressed, the relationship between Just Farming and the mungbean farmers will strengthen and become more profitable for both parties.

Case Study: Mr. Abdul Barek

Mr. Abdul Barek is one of the best performing farmers in the production hub. He followed 14 out of 18 steps specified in the crop calendar and he followed any additional instructions provided by Just Farming. He planted mungbean on a piece of land of 100 decimal, slightly smaller than the average size of 143 decimal. He said his production cost went down from BDT 3300 last year to BDT 2481 this year. This happened because he used less fertilizer.

Mr. Barek also got a good harvest of 165 kilogram which is better than the average of 135 kilogram / farmer. He sold his full harvest to Just Farming, receiving a total of BDT 12,870 at BDT 78/kg, thus giving him a margin of BDT 10,389. As can be seen, his total income is higher than the average of BDT 10,314. Mr. Abdul Barek incurred less cost and enjoyed a better earning than the average farmer within the hub.

Case study: Mr. Abdul Barek

5. LESSONS LEARNED

Despite a very promising market for premium mungbean in Bangladesh, constraints at both ends of the value chain inhibit the realization of its full potential; many of these were revealed through experience in the pilot phase. Four key lessons from the project experience are summarized below:

Primary market research

Findings from in-depth desk research and an interesting lead with ACI formed the basis of the pilot project proposal. Assumptions about the market demand and quality requirements for mungbean segment were based solely on secondary data. This research has proven not to provide sufficient insights into the actual market dynamics. There were significant gaps between what could be delivered at the end of the season and what interested buyers actually demand. Two main lessons are drawn from this for future entry into new products: 1) a more thorough direct market research has to be done to supplement findings from desk research, and 2) the first season needs to be set-up as a small pilot with a limited number of farmers to gain experience with production and produce good quality samples that can be shown to prospective buyers.

Behavioral change

Setting up a contract farming system with the farmers did not result in the expected adoption of production practices that had been seen in other crops Just Farming cultivates. The use of Just Farming's intent to buy back as an incentive to adopt the recommended practices was not strong enough to counter concerns of losing the harvest completely. This combined with the initial distrust of whether the company will actually buy the products resulted in a disappointing rate of adoption. Farmers do tend to adopt practices once they see the results in other fields. A long-term partnership with farmers is needed where gradually more farmers will adopt the recommendations.

Climate change

The effect of climate change is big on small producers in Bangladesh. In the last season, mungbean producers in the South suffered due to unexpected and disruptive weather patterns. It is estimated that 60-70% of their crops were destroyed due to excessive rainfall just prior to harvest. Crop planning based on traditional weather projections do not work anymore. Preventive measures need to be put in place in order to protect crops from getting destroyed. At the same time, mungbean producers should be trained on effective climate-adaptive production techniques and practices to protect from and minimize the impact of unexpected and irregular climate patterns.

Post-harvest and storage

There is still need for to improve facilities at the post-harvest level. Since millers are available locally, storage is currently the biggest challenge. Potential customers that have been approached indicated that consistent year-round supply is the major challenge in the industry. Institutional buyers of premium mungbean, such as ACI, exhibit demand for consistent supply of mungbean in high volume round the year. Just Farming is currently exploring options to get investment for the required facilities based on these learnings.

6. NEXT STEPS

The pilot project has helped us gain useful insights into the mungbean market and the associated challenges. This experience has resulted in a revised value proposition (as described in chapter 3). To address challenges faced in this pilot, two main actions are being taken in preparation for next seasons:

Creating year-round supply

Being able to fulfill this crucial element of the revised value proposition means exploring options around storage. The storage needs to limit losses of mungbean over the year and maintain the quality. This means we are currently researching different options to store. Getting this organized is essential to ensuring the year-round supply that many customers require.

Three different options have been considered:

1. *Rent local storage:* This is the most cost-effective option and will allow Just Farming to gain experience with the challenges of storing in a local, traditional manner. An initial analysis has shown that the issues with local storage are limited and that delivering year-round is an option. Just Farming would prefer to rent the full storage as to be in control of the storage conditions and measure quality decrease.
2. *Build local storage:* This is a more expensive option and does not give the flexibility to alter storage protocols if issues are faced during the first season of use. Since the intention is to increase quality over seasons, this does not seem a viable option moving forward.
3. *Build storage based on international best practice:* This would mean that the mungbean would be kept in a cold storage. Cooling will help reduce pests and quality deterioration over the year. It is currently unclear what the benefits of this would be compared to traditional storage. Without a clear understanding of the issues around storing mungbean in Bangladesh, it will also be difficult to design the cold store and bring in the necessary technology.

Besides the cost of storage, Just Farming will consider the cost of financing the mungbean stored. Capital is expensive in Bangladesh and it is unclear if price increases over the year will make a profitable business case. Secondary data to determine this conclusively is not available. For Just Farming this means that the best option currently is to pilot the next season with a rented local cold storage to understand the price dynamics and costs better.

Sales

A Chief Commercial Officer has been added to the Management Team to fast track marketing efforts. This has resulted in more client-facing meetings and the idea to perform a wider market research to confirm findings of the pilot (as mentioned in chapter 3). Besides the market research, Just Farming is also talking to different agencies to help with the branding of the company and its products. This will result in a B2B and B2C brand in the future.

Most importantly, Just Farming will focus less on building a long-term partnership from the start. This has proven to be difficult and the company needs a more established track record before this is possible. The initial phase of building that long-term relationship will be transaction based. This provides additional insecurity for both farmers and Just Farming but that is a necessary risk in the short-term.

The Just Farming business case

For Just Farming to have a sustainable coordination role in the value chain, it is important that the margin covers operational cost and profit. Because of this, the cost of support per kilogram production is one of the key indicators that Just Farming is monitoring. Without taking into account value adding services (e.g. storage), the following factors are crucial to lower this indicator: 1) ensuring all farmers can harvest, 2)



closing the yield gap, 3) increase number of farmers per production officer. One of the main challenges here is the monsoon and the risk it poses to the harvest. There are known solutions like improving water management and changing the crop cycle so the mungbean can be harvested earlier. If these three factors can be addressed, the cost of coordination is low enough for a profitable business case. This will remain a focus area in the next season.

With an additional focus on value adding services like processing and storage, the business case is impacted. It is likely to involve third parties making cost and quality less predictable and in control. Just Farming will slowly start adding these services in the offering to clients to ensure experience is gained before planning for scale. The objective is to learn in practice so staff and farmers are experienced if and when it is appropriate to go to scale.