Completion Report

NCF7

JutePP® - The Sustainable Material for Plastic Products

Bangladesh

Grantee: Juteborg Sweden AB

Other Partners: Razzaque jute Industries Ltd, Inclusive Business Sweden

Project start date: 01/10/2018

Project completion date: 07/12/2021

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Chairman of the board

March 27th, 2024

Date

Person responsible (Signature)

ANNEXES

1. EXECUTIVE SUMMARY

The NCF funded JutePP® project, had the aim to produce JutePP® granules as a sustainable material replacement of Polypropylene (PP) and glass fibre reinforced granules in plastic moulded products. The JutePP® project's purpose is also to improve the livelihoods of actors along the JutePP® supply chain and to ensure sustainable and inclusive economic growth while at the same time reducing environmental impacts by replacing virgin plastics with JutePP®. The JutePP® project was led by Juteborg Sweden in partnership with Razzaque Jute Industries Ltd., JuteLab International and Inclusive Business Sweden, from October 1st 2018 to October 31st 2021.

The expected outcomes were to i) test the green business concept for the production of the JutePP® granules and ii) minimise non-renewable resource use and carbon emissions from JutePP® granules, while making more sustainable the jute supply chain through the Farmer to Factory™ initiative that worked to ii) increase income-generating opportunities for jute farmers and jute supply chain workers and iii) increase resilience and adaptability to climate change and reduce environmental impacts for the jute farmers in Bangladesh.

The JutePP® project achieved major results and also encountered difficult challenges:

Juteborg and Razzaque partnered and formed the Joint Venture Company (JVC) named Juteborg Razzaque Bangladesh Ltd. to jointly produce and sell JutePP® in Bangladesh and internationally.

The JutePP® manufacturing machine was built in Italy and arrived in Bangladesh in mid-2021. Due to the Covid-19 pandemic, the machine suppliers were not able to travel to Bangladesh to finalise the machine installation at that time. This hindered many other project activities i.e. the production and sale of JutePP® granules, decent employment of JutePP® factory workers, etc.

The Farmer to Factory™ model was co-created and validated. Two-hundred and twenty-two (222) farmers engaged in the model and tested the Direct Purchase model by selling their jute directly to Razzaque at a higher price compared to the price that they would have received from traders. The original target was to reach 1 200 farmers.

JutePP® granules at 30 - 50% jute contain less non-renewable resources and emit less carbon emissions than virgin PP granules (Outcome 3.1). The target was to reduce 615,60 tons of carbon emissions (CO_2 eq.) from replacement of virgin PP (baseline) with JutePP® granules at 50% jute concentration, actual at project completion. The actual total greenhouse gas emissions at project completion were zero, since the JutePP® production did not start. Yet, preliminary greenhouse gas emission calculations show that each ton of virgin PP substituted by jute yarn would reduce 1,03 tons of CO_2 eq. emissions.

2. ACHIEVEMENT OF RESULTS

2.1. Achievement of outcomes and outputs

The following table presents the outcomes and outputs that were concluded or partly concluded.

Expected outcomes and outputs	Indicator(s):	Achievement of outcomes and outputs:
Outcome 1.1 Increase in income-generating opportunities	**Number of farmers with increased incomes in the JutePP® supply chain in Bangladesh***	**Target: 1 200 farmers** **Achievement: 222 farmers**
Output 1.1.1 Validated Farmer to Factory™ jute supply chain model	**Validated F2F™ jute supply chain model(s)**	**Target: 1 validated model** **Achieved: 1 validated model**
	Report(s) on the Validation of the Farmer to Factory™ jute supply chain model	Target: 1 report Achieved: 1 Report
Activity 1.1.1.1 Create partnerships with local organisation	See indicator Outcome 2.1	See indicator Outcome 2.1
Activity 1.1.1.2. Primary data on current situation by JuteLab Int.	Database(s) of farmers	Target: Not defined Achieved: 1 database
Activity 1.1.1.3. Workshops by JuteLab Int. to co-create strategies to increase productivity and income	Workshop(s) to co-create strategies to increase productivity and income	Target: Not defined Achieved: 1 workshop
Activity 1.1.1.4. Evaluate F2F™ model and report	See indicator Output 1.1.1	
Outcome 2.1 Tested green business concepts for the production of JutePP® granules	**Green business concept(s) tested**	**Target: 1 concept tested** **Achieved: 0 concept tested.** **It was not completely tested since the product was not sold.**
	Multi-stakeholder partnerships developed	**Target: 6 partnerships** **Achieved: 2 partnerships** **No more partnerships were needed.**

Output 2.1.1 Secured sourcing from farmers	**Signed Memorandum of Understanding (MoU) agreement to secure sourcing of jute fibre from farmers through the Farmer to Factory™ supply chain model**	**Target: 1 signed MoU** **Achieved: 1 signed MoU**
Activity 2.1.1.1 Sign MoU with jute-fibre producer with commitments towards better prices to farmers	See Output 2.1.1	See Output 2.1.1
Activity 2.1.3.1 Machine installation and training	Machines installed in Bangladesh (capacity =>720 MT JutePP®/year)	Target: 1 machine installed Achieved: 1 machine located in the factory in Bangladesh, but no installation. Covid-19 has hindered the final machine installation.
Activity 2.1.3.2 Formalization of the Joint Venture Company (JVC) and the lease agreement of machine space.	Legally registered Joint Venture Company (JVC) between Juteborg Sweden AB and Razzaque Jute Industries Ltd in Bangladesh	Target: 1 legally registered JVC Achieved: 1 legally registered JVC
	Factory lease agreement of machine space for JutePP® production	Target: 1 machine space lease agreement Achieved: 1 machine space lease agreement
Activity 2.1.3.3 Production, packaging and distribution	See indicator from Output 2.1.3	See Outcome 2.1.3
Activity 2.1.3.4 Marketing and promotion	Promotional advertisements and showcasing opportunities	Target: 25+ advertisements Achieved: 30 advertisements
	Trademark registration for JutePP® in Europe	Target: 1 trademark registration Achieved: 1 trademark registration
Output 2.1.4 Scale-up plan and financing opportunities identified	**Number of clients and investors that have shown interest in JutePP® granule.**	**Target: 25 clients and investors** **Achieved: 30 clients and investors**
	Number prototypes of end products developed, made of original JutePP® 30%-50% and virgin PP/ recycled PP/ Bioplastic	**Target: 30 prototypes** **Achieved: 26 prototypes** **Due to the lack of JutePP® granules, we did not manage to make more/bigger prototypes.**

Activity 2.1.4.2 Promote JutePP® & F2F™, reach new clients and investors	Same as indicator from Output 2.1.4	
Activity 2.1.4.1 Create financing strategy and scale-up business plan	Financing strategy and scale-up business presentation to investors	Target: 1 strategy and presentation Achieved: 1 strategy and presentation
Activity 2.1.4.3 Prototyping and innovation of products	Same as indicator from Output 2.1.4	
Output 3.1.1 Verified greenhouse gas emission reductions for cradle-to-gate JutePP® production	**Report stating verified greenhouse gas emission reduction calculations for replacing virgin PP granules (baseline) with JutePP® granules at 30-50% jute concentration, from cradle-to-gate**	**Target: 1 report** **Achieved: 1 report**
Outcome 3.2 Increased resilience and adaptability to climate change and reduction of environmental impacts for the JutePP® granule supply chain in Bangladesh	**Number of trained farmers with increased knowledge on how to respond to climate change and other important disturbances to their environment (i.e. number of people with increased resilience to climate change)**	**Target: 20 farmers** **Achieved: 23 farmers**
Output 3.2.1 Trained farmers to increase adaptability and resilience to climate change while reducing environmental impacts of jute supply chain	Training material for farmers to increase adaptability and resilience to climate change while reducing environmental impacts of jute value chain, at the time of reporting	Target: 1 training material Achieved: 1 training material
Activity 3.2.1.1 Workshop(s) with farmers to identify feasible practices for mitigation and adaptation	Workshop(s) with farmers to identify feasible practices for mitigation and adaptation	Target: 1 workshop Achieved: 1 workshop
Activity 3.2.1.2 Create training material from workshop outputs and conclusions	Same as Output 3.2.1	
Activity 3.2.1.3 Train farmers	Same as Outcome 3.2	

2.2. Deviations from the planned outputs and activities

The following table presents the outcomes and outputs that could not take place due to the delay in the machine installation in Faridpur, Bangladesh. The machine arrived in the new factory in Faridpur in July 2021, but no experts from the sourcing company in Italy were able to fly to Bangladesh to finish the setup and installation. Without the machine installation, the production of JutePP® granules could not commence, which hindered the creation of employment and the calculation of greenhouse gas emissions of the final production.

Expected outcomes and outputs	**Indicator(s):**	**Achievement of outcomes and outputs:**
Output 2.1.2 Decent employment for workers (>50% women) with wages higher than Bangladesh Minimum Base Salary	**Number of factory workers with decent jobs in the JutePP® factory with wages higher than Bangladesh Minimum Base Salary, expressed as Full-Time-Equivalent (FTE)*, with half or more being women**	**Target: 9 FTE jobs, >50% women** **Achieved: 0 FTE jobs, 0% women** **This output is dependent on the machine installation in Faridpur, Bangladesh.**
Activity 2.1.2.1 Promote job position within local community members and hire new staffs	Job advertisement in newspaper	Target: 1 job advertisement Achieved: 0 job advertisements This activity is dependent on the machine installation in Faridpur, Bangladesh.
Activity 2.1.2.2 Pay fair wages above the MBS	See indicator from Outcome 2.1.2	See Outcome 2.1.2
Output 2.1.3 Production of JutePP® granules	**Tons of JutePP® granules produced annually, at a jute concentration of 30% to 50% MT /year**	**Target: 720 tons** **Achieved: 0 tons (0,64 tons produced in Italy as a test)** **Since the machine was not installed, eventually these results have not been completed.**
Activity 2.1.3.3 Production, packaging and distribution	See indicator from Outcome 2.1.3	See Outcome 2.1.3
Outcome 3.1 Minimised non-renewable resource use and carbon emissions from JutePP® granules	**Total carbon emission (CO2 eq.) from replacement of virgin PP (baseline) with JutePP® granules at 50% jute concentration, actual at project completion**	**Baseline: 1 231,20 tons carbon emission (CO2 eq.) from virgin PP** **(1 231 MT CO2 eq = 720 MT PP granule * 1,14 ton CO2eq./ton PP granule * (18 months /12 months))** **Target: 615,6 tons of carbon emissions (CO2 eq) from JutePP® granules at 50% jute concentration**

		(615,6 tons CO2 eq = 720 tons JutePP® granule * 1,14*0,5 ton CO2eq./ton JutePP® granule * (18 months /12 months). **Achieved: The actual total greenhouse gas emissions at project completion was zero, since the JutePP® production did not start. For more information see 3. Climate Change Mitigation.**
Activity 3.1.1.1 Develop the baseline of greenhouse gas emissions	Same as Outcome 3.1	
Activity 3.1.1.2 Verify greenhouse gas emissions reductions with primary data	Same as Outcome 3.1 Report stating verified greenhouse gas emission reduction calculations for replacing virgin PP with JutePP®	

The following table presents the outcomes and outputs that were later on added to the project or changed during the course of the project, explaining the reasons for this.

Expected outcomes and outputs	**Indicator(s):**	**Achievement of outcomes and outputs:**
Activity 2.1.3.2 Formalization of the Joint Venture Company and the lease agreement for machine space to produce JutePP®	Legally registered Joint Venture Company (JVC) between Juteborg Sweden AB and Razzaque jute Industries Ltd in Bangladesh Machine space lease agreement for JutePP® production	Target: 1 company registered Achieved: 1 company registered Target: 1 machine space lease agreement Achieved: 1 machine space lease agreement A completely new factory site has been built (deviation from the original plan) in Faridpur. Due to internal concerns Razzaque had to build a new factory building since the one Juteborg visited in 2019, were not available any more.

2.3. Achievement of NCF indicators

The following table presents the achieved figures on how the JutePP® project has contributed to NCF indicators.

NCF core indicator	Results (quantitative)			Clarifications/Means of verification
Number of beneficiaries reached	women		6	The JutePP® project defines direct beneficiaries as those that benefited with new jobs in the JutePP® factory, farmers with increased incomes in the JutePP® supply chain and farmers that have participated in the F2F™ capacity building.
	men		239	
	total		245	
Number of people with increased resilience to climate change	women		6	23 trained farmers with increased knowledge on how to respond to climate change and other important disturbances to their environment. The farmers were trained as part of "Activity 3.2.1.1 Workshop with farmers to identify feasible practices for mitigation and adaptation".
	men		17	
	total		23	
Number of people with improved livelihoods	women		0	222 farmers that participated directly and indirectly in the F2F™ Direct Purchase Initiative and consequently received an increased income for their raw jute. There were 37 farmers that participated in the three years of the project, each farmer has approximately 5 more farmers hired temporarily to work in the farm. The income increase is distributed between the farmers. (Calculation: 37*6 = 222 farmers). Women also participate in some farming activities, yet since they are the wives of the farmers they do not receive a formal payment, but benefit indirectly.
	men		222	
	total		222	
New decent jobs created	full-time	women	0	The expected result was to have factory workers with decent jobs in the JutePP® factory, but since the JutePP® machine could not be installed, the jobs could not be created before the end of the project.
		men	0	
		total	0	
	part-time	women	0	
		men	0	
		total	0	
	seasonal	women	0	

		men	0	
		total	0	

3. CLIMATE CHANGE

The Intergovernmental Panel on Climate Change (IPCC) has already noted that Bangladesh will be among the worst victims due to climate change. The rainfall is predicted to become higher and more erratic, the frequency of droughts is likely to increase, flooding will intensify and salinity in the coastal belt will rise; leading to reduction on crop yields and crop production (Bangladesh Climate Change Strategy and Action Plan (BCCSAP), 2009). *The JutePP® project addresses both Climate Change Adaptation and Mitigation.*

Climate Change Adaptation:

The jute crop, compared to other crops, is more resistant to climate change related effects such as heavy rains, floods and extreme temperatures (World Bank 2011). Based on this conclusion, the JutePP® project proposes that jute cultivation can be an adaptation strategy for farmers. This is not to say that jute cultivation could not be affected. There still needs to be measures taken for jute cultivation to continue in the face of climate change effects: this includes protecting young jute plants from too much or too little rain (Islam et al. 2017), and creating accessibility to a climate change insurance for farmers, provided by Green Delta Insurance in several parts of Bangladesh already. These two solutions are included in the F2F™ model.

One of the expected project Outcomes was to "Increase resilience and adaptability to climate change and reduction of environmental impacts for the JutePP® granule supply chain in Bangladesh." As part of that, the project trained 23 farmers with increased knowledge on how to respond to climate change and other important disturbances to their environment.

Climate Change Mitigation:

JutePP® granules at 30 - 50% jute contain less non-renewable resources and emit less carbon emissions than virgin PP granules (Outcome 3.1). The target was to reduce 615,60 tons of carbon emissions (CO2 eq.) from replacement of virgin PP (baseline) with JutePP® granules at 50% jute concentration, actual at project completion (615,6 tons CO2 eq = 720 tons JutePP® granule * 1,14*0,5 ton CO2eq./ton JutePP® granule * 18 months / 12 months). The actual total greenhouse gas emissions at project completion were zero, since the JutePP® production did not start.

Once the JutePP® starts, the annual projected production is estimated at 1 440 tons in 2022, and 1800 tons per year thereafter. The greenhouse gas emissions reduction from the substitution virgin PP granules with JutePP® granules was calculated based on a standardized approach for calculating greenhouse gas emissions recommended by the Nordic Climate Facility. In the calculations, emission reductions were simply based on the substitution of 50% of virgin PP with Jute yarn. Each ton of virgin PP substituted would result in the reduction of 1,03 tons of CO2 eq. emissions[1]. Based

[1] Specific electricity consumption for PP is 0.56 MWh/t (Source: CDM methodology AMS-III.AJ.) Average grid emission factor for the Middle East is 0.679tCO2/MWh (Source:IGES database - list of Grid Emission Factors). Natural gas supplies the process required for

on this, it is projected that in 2022 the reduction would be of 742 tons of CO2 eq. emissions (= 1,03 tons of CO2 eq. emissions * 1 440 tons JutePP® /2), while the annual reduction in 2023 (and afterwards) would be of 928 tons of CO2 eq. emissions (= 1,03 tons of CO2 eq. emissions * 1 800 tons JutePP® /2). The complete greenhouse gas emission calculation is presented as an Annex 4.

It is worth pointing out that the use of chemical fertilisers and pesticides are the single biggest contributor to greenhouse gas emissions from the jute production, accounting for 40% of the greenhouse gas emissions. One of the workshops with jute farmers included a capacity building on advantages and correct use of natural fertilizers and other sustainable farming practices that could reduce the greenhouse gas emissions.

4. DEVELOPMENT IMPACTS AND CROSS-CUTTING ISSUES

The JutePP® project defines direct beneficiaries as those that benefited with new jobs in the JutePP® factory, farmers with increased incomes in the JutePP® supply chain and farmers that have participated in the F2F™ capacity building.

Farmer to Factory™

The Farmer to Factory™ model's purpose is to make the jute supply chain more sustainable and to lay the ground to be able to have the supply chain certified with a chosen/created sustainability standard. Social inclusion and environmental sustainability of farmers was promoted through a workshop with farmers in Faridpur. The workshop explained the F2F™ model, created understanding of the challenges of farmers and co-created solutions. There were 14 social and environmental challenges identified upstream of the jute supply chain, mainly in jute farming. 29 potential solutions were identified with supply chain stakeholders and clustered into 7 categories: Empowerment, Higher quality inputs and outputs, Better agriculture, Improved stripping and retting, Increased income, Attractive & valuable work and Sustainability assurance.

One of the key solutions at the heart of the F2F™ model is the Direct Purchase model, in which the farmers have an agreement to sell directly to the jute mill. The farmers that participate earn higher incomes because they bypass the trader. The F2F™ Direct Purchase model was tested with jute farmers in Faridpur during 2019, 2020 and 2021, resulting in 222 farmers with increased incomes (indicator of Outcome 1.1). Farmers were surprised and happy about the fact that they were paid upfront and with a higher price compared to the market price. The jute that was purchased from the F2F™ Direct Purchase model was used to make jute yarn for other jute products. After the closing of the NCF funded JutePP® project, jute farmers will still be able to sell directly to Razzaque and their jute will be used for JutePP® granules, once the production has started (expected in early 2022).

Women, especially the wives of the farmers, also work with jute. The task that women usually do is the drying of jute (once the jute comes back home), they don’t get paid directly but they are

thermal cracking and the default specific energy consumption of 11.6GJ/t for PP is used (Source: CDM methodology AMS-III.AJ.) Emission factor for natural gas 0.0561tCO2/GJ (Source: 2006 IPCC Guidelines for National Greenhouse Gas Inventories). For simplicity it is assumed that the baseline emissions from transporting virgin PP pellets from country of manufacture are comparable with the project emissions from producing JutePP® granules and from PP, Jute yarn and compatibalizer and are therefore not considered. Emission reductions are therefore simply based on the substitution of 50% of PP with Jute yarn i.e. each ton of PP substituted results in the reduction of 1.031tCO2 emissions (i.e. ((0.56MWh/t*0.679tCO2/MWh) + (11.6GJ/t*0.0561tCO2/GJ))). JutePP® annual production projected to be 1,440t in 2022, and 1,800t/y thereafter.

benefiting indirectly from the income that their husband earns. This is why they are not counted as farmers with increased incomes. 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™ model, 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.

JutePP® Factory

One of the intended outputs for the JutePP® project was to employ 9 factory workers with decent jobs in the JutePP® factory, out of which at least 50% would be women in order to promote gender equality. The target was not reached since the JutePP® machine was not installed before the end of the JutePP® project. Once the JutePP® production begins, employment will follow the JVC "Code of Conduct" (CoC) and "Code of Ethics" (CoE). The documents are detailed and customized as the guidelines for working in a less developed country with partners, suppliers, customers and workforce. It includes the values and basic rules for gender, equality, human rights, environmental issues, zero tolerance of corruption, etc. A side note is that in the Razzaque jute mill factory 75-80% of employees are women.

5. ASSESSMENT OF THE RESULTS AND IMPACTS OF THE PROJECT

5.1. Relevance

Jute used to be the first export income for Bangladesh in the 70's - 80's but now is the third. 40% of jute is exported, whilst the rest is used in traditional low-value products. There is a need to revitalise the industry and innovate higher value products from jute. The production of JutePP® granules (Output 2.1.3) will be a promising step towards that direction. A total of 26 prototypes of end products, made of original JutePP® 30%-50% and virgin PP/ recycled PP/ Bioplastic, were developed as part of the JutePP® project (Output 2.1.4). The potential customers who have actively contributed in the prototyping of JutePP® were very interested and happy with the results and see Juteborg as a supplier of sustainable materials for their products. The product benefits therefore also the customers.

From the beginning of the project the commercial production of JutePP® was backed by a large Swedish international retailer as the end customer of JutePP® hangers. Their requested volume would cover almost one third of the start-up production capacity (720 tons/ year). During the JutePP® project a total of 23 international clients showed interest in the JutePP® granules, but it was also discovered that Bangladesh has a potential market. Bangladesh imports $1.7 billion/year worth plastic. Through the implementation of the project, Bangladesh becomes more independent from unsustainable plastic-imports, by replacing virgin plastics with materials from their home market.

In Bangladesh, approximately one third of the population, of 170 million people, works in the jute industry. Jute farmers often live in conditions of poverty in Bangladesh. During the F2F™ validation, 222 farmers had increased incomes in the JutePP® supply chain in Bangladesh (indicator of Outcome 1.1). Through the F2F™ initiative, farmers would be more empowered and their livelihoods improved, whilst the country of Bangladesh can make use of its traditional jute industry more profitable and sustainable. The Bangladesh Minister of jute showed interest in the project by participating in one of the workshops organized in Faridpur.

5.2. Effectiveness

The Juteborg and Razzaque business partnership resulted in the formation of the Joint Venture Company registered in Bangladesh (in August 2020) and the construction of a factory building (not included in the original plan) for the production of JutePP® granules. The JutePP® machine was built in Italy and transported to Bangladesh (arriving in July 2021). Due to Covid-19 the construction, transport and installation of the machine was delayed. The time lags and higher costs for the machine have put great pressure on the partners and the JVC. The green business concept could not be tested entirely (Outcome 2.1), since it is dependent on the production and sales of JutePP® granules (Output 2.1.3). Yet so far the indication is that the business has a great potential to be viable, in fact the partners together believe that it has the potential of becoming a successful business.

Two-hundred and twenty-two (222) farmers participated in the JutePP® supply chain and earned higher incomes for their jute by selling directly to Razzaque (Outcome 1.1). It was a big success to see that the F2F™ Direct Purchase model resulted in an increase in farmers' incomes. Yet, the original target was to reach 1200 farmers with increased incomes in the JutePP® supply chain in Bangladesh (Outcome 1.1). This was not achieved mainly due to three barriers: 1) Lack of trust in the Farmer to Factory™ model because of its novelty, 2) Traders put pressure on farmers and the jute mill to not trade directly and depend on traders since they pre-sell their crops and, 3) jute market price alters the dynamic - high jute cost disincentives farmers to sell directly to the jute mill. One of the success factors is that Razzaque's high management is committed to supporting and empowering the farmers.

5.3. Efficiency

The business partners Juteborg and Razzaque, have registered a joint venture company in Bangladesh. At the start of the project the original partnership was between Juteborg and another Bangladeshi company. Extra time, efforts and costs were spent on creating the partnership with Razzaque. The JVC between Razzaque and Juteborg was created and registered successfully, yet to achieve that, they had to go through a long process to comply with the laws in Bangladesh.

With regards to the JutePP® machine installation and delivery, time- and cost-efficiency were hampered due to unforeseen challenges in the construction of the JutePP® machine followed by the spread of the Covid-19 pandemic. The shipment and storage whilst waiting for the continuation of the shipment incurred substantial additional costs. The operational efficiency was disrupted even after the shipment was completed as no operator from the source company was able to travel to Faridpur, Bangladesh to install the machine.

In general, the project plan was ambitious and the implementation took more time, money and effort than initially planned for.

5.4. Impact

The intended impacts of the JutePP® project were:

- Livelihood improvement and reduction in poverty along the JutePP® supply chain in Bangladesh.

- Sustainable and inclusive economic growth within the JutePP® granule supply chain, expected during the lifetime of the JutePP® granule machine.
- Expected reduction of environmental impacts from the production of JutePP® granules; taking special measures to reduce greenhouse gas emissions and non-renewable resources while adapting to climate change impacts.

The main Outcomes and Outputs from the project contribute towards the achievement of these impacts. For example, we could see that the workshops certainly influenced farmers' perceptions and values regarding jute farming to a certain degree. Nonetheless, it is not possible to provide a conclusion at the impact level, since some of the key intended Outcomes and Outputs were not achieved. The project efforts are still being done at the level of the Outcomes and Outputs, which will take more time and resources.

5.5. Sustainability

The JutePP® project partners have the intention to continue with the JutePP® production and with the F2F™ initiative. The next steps are to start the JutePP® production, validate the business model and pilot the F2F™ initiative with 4 solutions.

The financial sustainability (of JutePP® and the F2F™ initiative) relies on having a successful green business model for JutePP® granules. The revenue model considered a 10-15 % higher price for JutePP® granules (compared to the material it is replacing) which potential customers have expressed their willingness to pay. It seems that the market is now prepared for a higher material cost, if all other goals of sustainability and the technical performance are good enough for the clients. It is important for the sustainability of the JutePP® business for the partners to start as soon as possible the JutePP® production and sales. After that the business model can be fully tested and the bank loans paid.

The sustainability of jute cultivation relies, in a simplistic view, on farmer's profitability for the economic activity and the viability to continue jute cultivation mainly due to climate change. According to Jassim Hossain, advisor at Razzaque, who tested the economy of jute production in Faridpur, the jute production is profitable unless there is a drought, very extreme rainfall or pests (worsened by climate change). In all other cases jute cultivation is a profitable agricultural practice, and generally more robust to climate change compared to other crops. Jute is further cultivated in areas where no other plants can be cultivated, at least in particular times of the year. The cultivation is further enhanced in the culture of Bangladesh over several centuries, which is why it will most likely continue in the future. Nevertheless, it is the purpose of the F2F™ initiative to solve critical challenges of the sustainability of jute in order for this economic activity to continue and prosper.

5.6. Coherence

The demand for natural fibre granules is steadily increasing globally. Stora Enso, a big Swedish international forest company, has innovated DuraSense® a wood fibre granule. Dura Sense® and JutePP® are comparable products for injection moulded products yet, the JVC is confident that JutePP® has a valuable competitive advantage over DuraSense®. Stora Enso set up an entire sales organisation in Europe before the Covid-19 pandemic outbreak in 2020. The strategy is that Stora Enso will do the work to sell the biogranule, and then JutePP® will be a "fast follower" presented with its unique selling points.

As for the Asian market, the JVC partners believe that JutePP® granules have a competitive advantage over, for example, the Dura Sense® granule, especially due to the lack of big forests in Asia and avoiding long transport. All plastic in Bangladesh is imported, with high import tax. Bangladesh has the potential to be more self-sufficient by producing and consuming JutePP® granules with recycled Polypropylene - the potential is to produce bioplastic locally and without needing to import such large volumes. There are Asian companies (i.e. in China and Korea) that have interest in creating similar materials as JutePP® granules.

When it comes to biomaterials like jute, it is a hygiene factor to have a sustainability certification in the supply chain. The F2F™ model is an initiative by Juteborg that will set the foundation for a sustainability certification of the jute supply chain; "Better Jute Initiative". This initiative gathers under one umbrella other organisations that are already providing services to the farmers and facilitates access to the jute farmers. The intention is not to reinvent the wheel, when another organisation has a viable solution we invite them to collaborate. Also important to mention, is that the Government of Bangladesh provides different incentives in order to lift the jute industry and support the jute farmers.

6. INNOVATION

The project comes with two main innovations: an innovation of material and an innovation within the supply chain (F2F™model).

Many countries are already taking actions to reduce plastic usage by banning and imposing higher tax on the plastic products. The European Union has recently declared a plastic strategy aiming to reduce plastic usage by 2030. Some of the big international retail clothing stores have set an agenda to use sustainable materials in all their products and accessories by 2030.

Jute fibre reinforced plastic granules (JutePP®) contain 30-50% jute and the rest Polypropylene. The JutePP® granules are an innovative material that replaces Polypropylene and Fiber Glass reinforcement granules, for the production of "plastic" moulded end-products (such as hangers, kitchen products, cable-brackets, cable pipes etc.). The JutePP® brand name became a registered trademark by Juteborg. Most of the jute produced in the country is used locally to manufacture low-value products such as ropes and sacking. With products like JutePP® the value of jute is increased compared to the traditional jute products used in Bangladesh.

The jute industry in Bangladesh has low resources and innovation capacity. The F2F™ initiative consists of 29 innovative solutions to address the social, environmental and economic challenges upstream of the jute supply chain. These solutions might be tested in other contexts, but they are innovative in the jute context in Bangladesh. The specific solutions will provide Empowerment, Higher quality inputs and outputs, Better agriculture, Improved stripping and retting, Increased income, Attractive & valuable work and Sustainability assurance. When it comes to innovation at the jute cultivation level there needs to be careful management of the risk that farmers take in testing innovative solutions since there could be unintended negative consequences that farmers can suffer in the long run.

7. POTENTIAL FOR SCALING UP AND FOLLOW-UP INVESTMENTS

As part of the NCF-grant, JutePP® project partners developed a scale-up plan:

Phase A: Pilot, 2021-2022

Scale-up business plan is validated and prepared for investment pitch.

F2F™ business model finalization and prepare for pilot.

Phase B: Scale-up 1, 2023-2024

One additional JutePP® machine at full capacity of JutePP® production

Add 3 injections moulding for producing and selling own finished products from JutePP®.

F2F™ pilot implementation

Phase C: Scale-up 2, 2025 to 2030

One additional JutePP® machine at full capacity of JutePP® production

Add 3 injections moulding for producing and selling own finished products from JutePP®

F2F™ scale up

At the end of the project, the project partners consider that parts of the JutePP® project are still in the pilot phase. Due to Covid-19 we were not able to finalize all planned activities, so there is a need to complete some next steps, such as completing the business models testing. However, this does not hinder the scaling-up of e.g. JutePP® production as such, but we need to continuously work for sustainability and the validation of the complete jute supply chain.

There are two potential investors for the scale-up phase: The Dutch Fund for Climate and Development (DFCD) and Asian Development Bank Ventures (ADBV). Discussions were ongoing for over two years with the Business and Investment Officer at DFCD. Juteborg presented its Business Strategy and Scale-up plan in January 2021 (also relevant for other potential investors). Once the production is set and the turnover has started, contact will be taken again. Juteborg has had good contact with the ADB, which has been interested in the JutePP® and F2F™ initiative. The ADB has a venture capital and technical assistance facility declared recently to boost start-ups in Asia Pacific with impact technology solutions that address climate change and contribute to Sustainable Development Goals (SDGs). Juteborg and Razzaque plan to approach them at a later stage.

8. RISKS

Project Risk Description: The spread of Covid-19 affecting the JutePP® production
Impact on Project: Delay of machinery shipment and a continuing hold-up regarding the installation of the machine in Faridpur, Bangladesh. This leads to a delay in the production and sale of JutePP®, and therefore also in a delay to provide employment and higher wages.
Mitigation Measures: We are in close contact with the suppliers, about how to finalise the installation. We are continuing all activities not affected by Covid-19. The Bank in Bangladesh is engaged. The Letter of Credit has been used as the instrument to purchase the machine. The involvement of the bank, LC and the supplier connection with the local partner mitigated the risk. Razzaque is responsible for procuring the machine and they have successfully purchased the machinery. The ownership of the machine will then be transferred to the JVC.

Project Risk Description: Pressure from jute traders to stop the F2F™ Direct Purchase model.
Impact on Project: The F2F™ farmers might lose the interest to be part of the project thus the validation might be hampered.
Mitigation Measures: The jute mill i.e. Razzaque might struggle to get the adequate jute fibre

supply during their need. Thus, the traditional jute business, JutePP® production and F2F™ might be impacted.

Project Risk Description: Project Finance is stressed affecting the JutePP® partners and business model.
Impact on Project: The delayed production plans are putting pressure on the cash liquidity of the lead Nordic partner as the time plan for the revenue generation is pushed back.
Mitigation Measures: We continue to get private investors on board and we are trying to receive a bank loan. Razzaque has a loan from a Bangladeshi Bank to cover extra machine expenses and the working capital. Yet there are high interest rates, and the revenues have not started.

Project Risk Description: Customer loss of momentum due to long waiting time
Impact on Project: The risk that potential end-customers, who had already signed a MoU with Juteborg at the start of the NCF-funded project would not want to wait as the production is 1-2 years late.
Mitigation Measures: The lead Nordic partner has engaged with the end customer. This has mitigated the risk as the end customer has recommended one of their new suppliers of garment hangers for JutePP®. Other end customers were updated about the progress. A website was developed for the F2F™ and JutePP®. This website will contain information for the listed customers.

Project Risk Description: The risk for farmers not to be able to participate in the F2F™Direct Purchase model and thus not have the foreseen increase in income.
Impact on Project: The F2F™ farmers might lose the interest to be part of the project thus the validation might be hampered.
Mitigation Measures: The F2F™Direct Purchase model was tested despite the progress and challenges in other parts of the project (i.e. the machine not arriving on time to start the production).

9. MONITORING AND EVALUATION

The Monitoring and Evaluation was managed by Inclusive Business Sweden based on the agreed Results Chain (with minor changes throughout the project) and following the DCED (Donor Committee for Enterprise Development) Standards. Data from each indicator was gathered either after the completion of an Activity/Output or at the wrap up of each milestone. The data for most indicators was provided by the JutePP® partners, with the exception of the indicator for Outcome 1.1 “Number of farmers with increased incomes in the JutePP® supply chain in Bangladesh”. This data was gathered from farmers. Razzaque staff created a baseline database of 1200 jute farmers by visiting their homes. Then they tracked the number of farmers that participated in the F2F™ at the purchase point in the Razzaque jute mill. All farmers that participated in the F2F™ Direct Purchase model received higher prices than the market price or the traders’ price.

10. LESSONS LEARNT

In the beginning of the project we needed to make a big change of partners in Bangladesh. It was truly a challenge and these challenges often come with a few warning signs beforehand, so setting up alternative ways of action will always be a Juteborg strategy.

Learning from Stora Enso's experience, they were further ahead in starting the sales before the Covid 19 pandemic broke out - it probably was very fortunate that the start of the production was delayed. Otherwise, if Covid 19 would have broken out after production was set up, sales were done and contracts written, it would also probably create immense difficulties and financial loss if not being able to deliver, which could have been a huge risk.

As per the F2F™ initiative, there were key lessons on the challenges and potential solutions that stakeholders have validated. On the implementation of the Direct Purchase model, key barriers were identified and will be considered in the redesign of the model before its implementation.

Another lesson learnt was that most business activities take more time and resources than originally planned, therefore these needs to be taken into account in the project management.

11. OUTREACH

Results from the JutePP® project have been promoted to the general public in Sweden and Bangladesh and to potential JutePP® clients, investors, and stakeholders. Different communication materials for JutePP® granules were produced and are still being disseminated. Marketing is done by establishing direct contact with potential customers in Sweden and Bangladesh. As part of the marketing, twenty-six JutePP® prototypes were created for end products for potential clients. A complete list of communication materials for clients, investors, stakeholders and the general public is presented:

- A dedicated web platform for F2F™ has been created (https://farmer2factory.com), where Juteborg updates about the F2F™ activities.
- Juteborg has made 3 blog posts related to the NCF funded project that were published at https://www.Juteborg.se/blog/. Juteborg also publishes regularly about JutePP® and F2F™ in their social media (reaching more than 2 200 people). A Podcast channel was created to disseminate the key message about the JutePP® business and F2F™ model at www.Juteborg.se
- Professional datasheet for JutePP® that shows the characteristics of JutePP® to be shown to potential customers.
- Inclusive Business Sweden published a webpage on the JutePP®-NCF project on their website (https://inclusivebusiness.se/new-test/). IBS also has shared 1 story of the F2F™ initiative in their social media (reaching more than 2 000 followers).
- Three (3) newspapers in Bangladesh published news about the F2F™ workshop and training.
- Juteborg's Social Media Ambassador made 3 posts on social media which had around 1.6 million views combined.
- The Swedish Ambassador to Bangladesh - Charlotta Schlyter highlights Juteborg and its jute mission in her interview on one of the prominent TV channels in Bangladesh.
- Lokalförvaltningen in the Gothenburg Commune highlighted Juteborg in a video.

- City of Gothenburg chose to include Juteborg in a video for their project Fossilfree city 2030.
- An article on JutePP® and F2F™ was included in the magazine published in Bangladesh on national jute Day
- Juteborg has updated a brochure containing information about JutePP® and F2F™ initiative. More than 200 copies were printed and disseminated. In addition, 2 roll ups were also made to disseminate messages from attending events.
- Juteborg took active part in the Inclusive Business Forum 2019 in Gothenburg. There was a dedicated stand to disseminate the information of JutePP® and F2F™.
- Juteborg promoted JutePP® at one of the meetings at the Open Innovation Collaboration Platform Lighter Arena. (https://lighter.nu/en)
- Juteborg promoted JutePP® to H.E M. Riaz Hamidullah, an Ambassador of Bangladesh in the Netherlands. (http://bangladeshembassy.nl/ambassador/)
- Juteborg appeared in a live show together with two of Bangladesh's ministers (https://farmer2factory.com/Juteborg-in-discussion-with-2-ministers-on-a-live-talk-show/)
- Juteborg pitched JutePP® in the CIA program 2020/2021.
- Three (3) articles were published in the Swedish magazine Polymervärlden about jute and Juteborg.
- Juteborg was one of 6 exhibitions and presenter at an Automotive Tech event in 2019.
- A test report from one of the prototypes, made for an Original Equipment Manufacturer in the automotive and transport sector, showed very promising results and was a very important test result which gave JutePP® trustworthiness in discussions with potential customers.

12. FINANCIAL SUMMARY

Table. Project financing per partner

Item	Expenditures for the milestone	Budgeted costs for the milestone	Milestone expenditures vs. budgeted milestone costs (%)	Cumulative expenditures to date	Budgeted costs for full project	Available funds	Cumulative expenditures vs. budgeted costs for full project (%)
NCF	150 673	150 673	100%	250 000	250 000	0	100%
Juteborg Sweden AB	75 402	72 898	103%	104 057	101 553	-2 504	102%
JuteLab International	29 824	30 695	97%	61 247	62 118	871	99%
Inclusive Business Sweden	0	0	0%	0	0	0	0%
Razzaque Jute Industries Ltd	100 292	101 926	98%	110 319	111 953	1 634	99%
TOTAL	356 191	356 191		525 624	525 624	0	

13. CONCLUSIONS AND RECOMMENDATIONS

The timing of starting to produce JutePP® now is perfect. The world has reached higher climate awareness now than ever. The doors are open and knocking is not even necessary. Potential customers are in fact reaching out to us.

We believe that testing green business in the NCF project has given Juteborg and partners immense opportunity as well as the dignity of being a grantee of Nordic Development Fund via Nordic Climate Facilities. This opportunity has paved the road for the implementation of JutePP® production being sponsored by the Nordic countries.

We have to understand that the project´s name is “Testing Green Business”. Testing is very much about not being able to plan everything from the start but rather about being alert, taking the right measurements, sometimes changing directions when it needs to be done, for the sake of the business, and driving the business to its goal.

JutePP® business now has a big responsibility to carry out the plan of JutePP® production as well as F2F™, since so many people are involved and they trust that the mission will be fulfilled. The way forward now is to continue the next steps in the pilot, of utmost priority is to start the production and start the sales of JutePP®. In our 10 year plan - JutePP® business will be scaled up. The scaling up plan has been presented to the potential investor DFCD which is very interested in the JutePP® business and it’s high impact potential.

Annex 1 Project completion fact sheet

Project Name:	**JutePP® - the sustainable material for plastic products**		
Project no.	NCF-C7-070		
Country:	Bangladesh, Sweden	**Financing:**	
		EUR	**%**
Nordic Partner:	Juteborg Sweden AB	**104 057** (101 553)	102%
Local Partner:	Razzaque jute Industries Ltd.	110 319 (111 953)	99%
Other Partner:	Inclusive Business Sweden	0	0%
	JuteLab International	61 247 (62 118)	99%
	NCF grant disbursed	250 000	100%
	Total	**525 624** (525 624)	**100% for the total project compared to original budget**
Classification:	Combination		
Project cycle:	Project start date: 01.10.2018 Original closing date: 31.12.2020 Actual closing date: 31.10.2021		
Short project description:	The project intends to source jute directly from jute-farmers to produce JutePP® granules which shall replace Virgin PP granules. It intends to improve the livelihoods of actors along the JutePP® supply chain and to ensure sustainable and inclusive economic growth.		

Project performance:	**Expected Outcomes and Outputs**	**Achieved**	**End-of-project status**
	Outcome 1.1 Increase in income-generating opportunities	Partly	Target: 1 200 farmers Achieved: 222 farmers
	Output 1.1.1 Validated "Farmer to Factory™" jute supply chain model	Yes	Target: 1 validated model Achieved: 1 validated model
	Outcome 2.1 Tested green business concepts for the production of JutePP® granules	No	Target: 1 concept tested Achieved: 0 concept tested. Target: 6 partnerships Achieved: 2 partnerships (Juteborg-Esquire and Juteborg-Razzaque)

			No more partnerships needed.
	Output 2.1.1 Secured sourcing from farmers	Yes	Target: 1 signed MoU Achieved: 1 signed MoU
	Output 2.1.2 Decent employment for workers (>50% women) with wages higher than Bangladesh Minimum Base Salary	No	Target: 9 FTE jobs, >50% women Achieved: 0 FTE jobs, 0% women
	Output 2.1.3 Production of JutePP® granules	No	Target: 720 tons Achieved: 0 tons (0,64 tons produced in Italy as a test)
	Output 2.1.4 Scale-up plan and financing opportunities identified	Yes	Target: 25 clients and investors Achieved: 30 clients and investors Target: 30 prototypes Achieved: 26 prototypes
	Outcome 3.1 Minimised non-renewable resource use and carbon emissions from JutePP® granules	No	Target: 615,6 MT CO2 eq Achieved: Zero since JutePP® production did not start.
	Output 3.1.1 Verified greenhouse gas emission reductions for cradle-to-gate JutePP® production	Yes	Target: 1 report Achieved: 1 report
	Outcome 3.2 Increased resilience and adaptability to climate change and reduction of environmental impacts for the JutePP® granule supply chain in Bangladesh	Yes	Target: 20 farmers Achieved: 23 farmers
	Output 3.2.1 Trained farmers to increase adaptability and resilience to climate change while reducing environmental impacts of jute supply chain	Yes	See Outcome 3.2
Climate change outcomes and impacts:	The project intends to reduce environmental impacts by replacing virgin and Fiber Glass reinforcement PP granules with JutePP® granules. This will lead to less plastic in the environment. Further, it trains farmers in the areas of climate change mitigation and adaptation within jute production.		
Development outcomes and impacts:	The JutePP® project improves livelihoods by training farmers, by securing their income within the F2F™-model and by creating decent jobs with Razzaque jute Industries Ltd.		
NCF core indicators			

NCF core indicators	Results (quantitative)			Clarifications/Means of verification
Number of beneficiaries reached	women		6	Direct beneficiaries are farmers with increased incomes, farmers that have participated in the workshops, and employees in the JutePP® factory.
	men		239	
	total		245	
Number of people with increased resilience to climate change	women		6	23 trained farmers with increased knowledge on how to respond to climate change and other important disturbances to their environment.
	men		17	
	total		23	
Number of people with improved livelihoods	women		0	222 farmers participated in the F2F™ Direct Purchase Initiative and consequently received an increased income for their raw jute. Women also participate in some farming activities, yet since they are the wives of the farmers they do not receive a formal payment, but benefit indirectly.
	men		222	
	total		222	
New decent jobs created	full-time	women	0	The expected result was to have factory workers with decent jobs in the JutePP® factory, but since the JutePP® machine could not be installed, the jobs could not be created before the end of the project.
		men	0	
		total	0	
	part-time	women	0	
		men	0	
		total	0	
	seasonal	women	0	
		men	0	
		total	0	

Annex 2 Results Framework

Annex with an updated results framework presenting the achieved results in the project is presented. The annex results framework includes the changes agreed during project implementation.

Annex 3 Pictures

Annex with pictures, photo credits and description of each attached photo.

Annex 4 Greenhouse gas emissions reduction calculation

Annex with updated greenhouse gas emission reduction from the replacement of PP virgin granules with JutePP® granules.

Annex 5 Impact story

Annex of an impact story from the Farmer to Factory™ Direct Purchase model.