SDM Case Report: Coscharis Farm

Service Delivery Model assessment: short version

July, 2020

Location:	Nigeria
Commodity:	Rice
Services:	Training, planting material, agrochemical, mechanization, insurance, finance, access to land and water, farmer organization.

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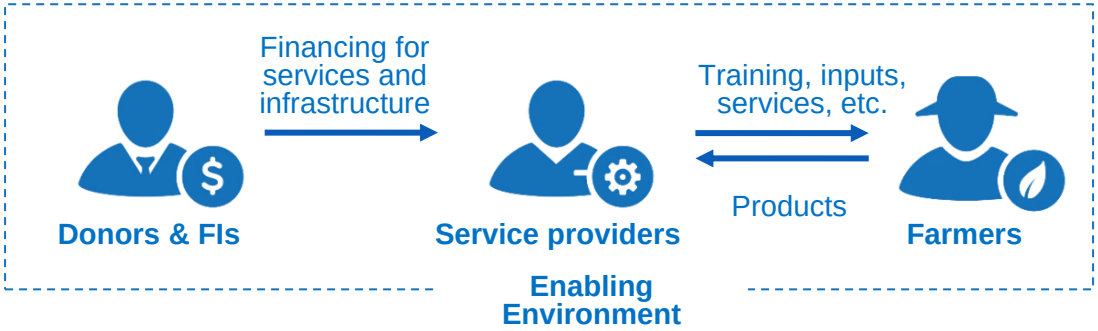
NewForesight

COSCHARIS GROUP

What are SDMs and why are we interested in analyzing them?

Service Delivery Models (SDMs) are supply chain structures, which provide services such as training, access to inputs and finance to farmers, to improve their performance, and ultimately their profitability and livelihoods.



By analyzing SDMs, we aim to support **efficient, cost-effective and economically sustainable SDMs at scale** through:

- Key drivers for success of SDMs benchmarking
- Innovation opportunities to support
- Cross-sector learning, learning community
- Convening at sector and national level

Analyzing SDMs brings a range of benefits

Farmers and farmer organizations

- **Better services** improve productivity, product quality, quality of life and social and environmental outcomes
- **Better outcomes**: improved productivity, income and resilience

SDM operator

- **Understand** your model's business case
- Gain insights to **improve** service delivery
- Develop **cost-effective** SDMs based on insights
- Identify opportunities for **innovation** and **access to finance**
- **Learn** from other public and private SDM operators operating across sectors/geographies
- **Communicate** stories of impact and success at farmer level

Investors/FIs

- **Common language** to make better informed investment decisions
- Insights to achieve optimal **impact, efficiency and sustainability** with investments and partnerships in SDMs

The Coscharis SDM and objectives

General SDM information:

Location:	Nigeria
Timing in analysis scope:	2020-2024
Scale (start of analysis):	763 farmers
Scale (end of analysis):	15,250 farmers
Funding:	SDM operator (Coscharis Farm)
SDM Archetype*:	National

Coscharis Farms Limited (Coscharis Farms) is a subsidiary of Coscharis Group that commenced farm development activities in mid 2015. It is strategically located at Anaku, in Anambra State, Nigeria.

Coscharis Farms' current investment in the agricultural sector is a comprehensive rice value chain encompassing rice cultivation, milling, storage and marketing. The farm is currently growing on 2,500 ha of land with an anticipated 10,000 ha of out-growers scheme in the first phase of the project implementation. In 2019, Coscharis Farms built and commissioned a 40,000 MT rice mill. The company also secured the approval of the Federal Government of Nigeria to manage a 25,000 MT silo complex for storage. . The silo is managed through a 10-year concession from the Federal government. Coscharis Farms has developed a social impact model in conjunction with the Anambra State Government.

Coscharis Farms provides jobs and vocational training through its farm and facilitates community development through construction of road networks linking its planting community and Anambra's central business district.

SDM vision:

Establish a stable supply of high quality rice while contributing to improve local smallholders' livelihoods and Nigerian food security

SDM objectives:

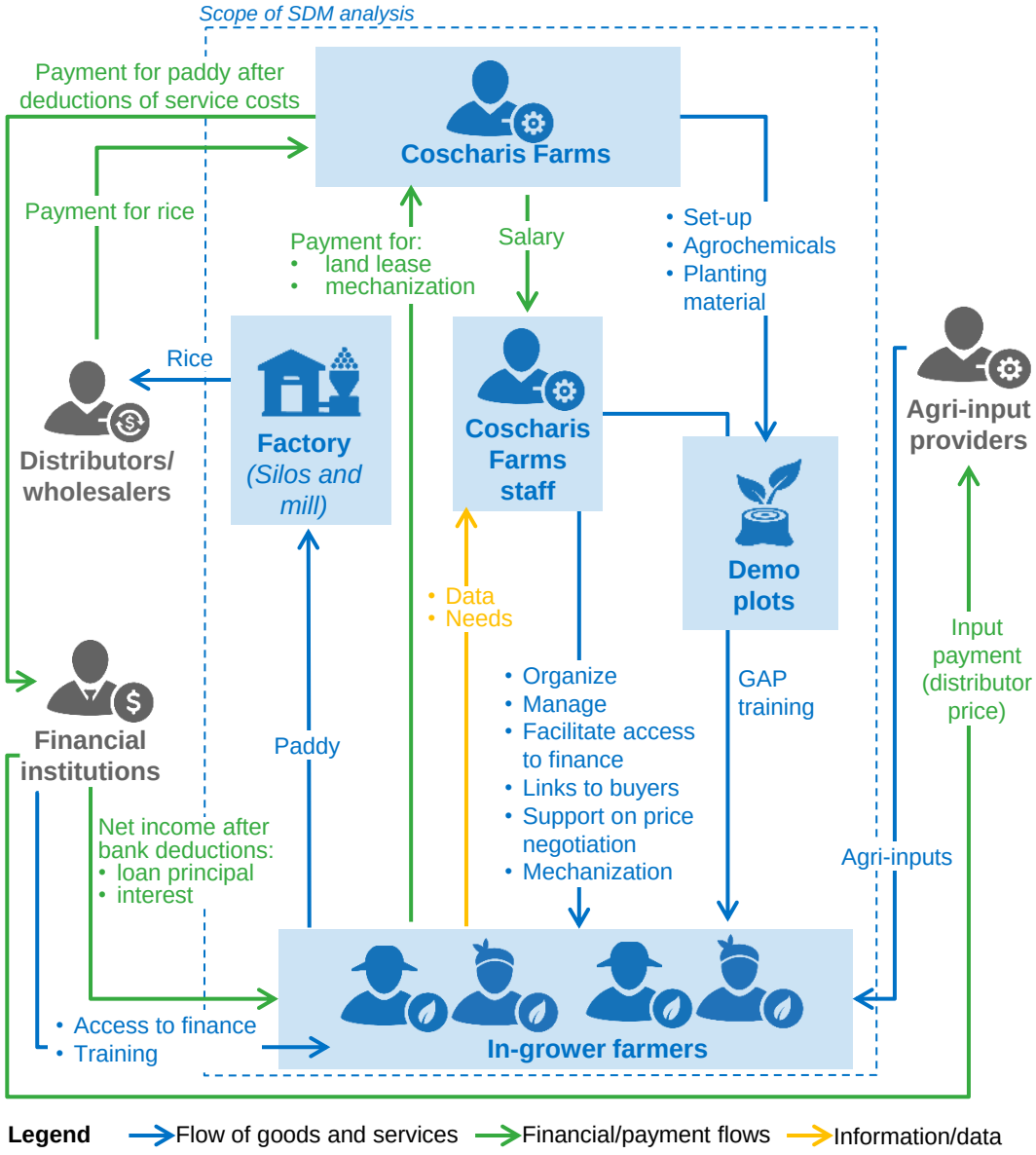
1. Secure a reliable supply of the right quantity and quality of paddy rice for the current and upcoming rice mill(s)
2. Implement in- and out-grower programs to supplement Coscharis Farms' production and improve local smallholders' livelihoods

SDM rationale:

For more info on SDM archetypes, see the IDH Smallholder Engagement Report

Sources: **1)** *1) Coscharis Farms Limited Proposal (March 22, 2019), 2) Coscharis Group website*

SDM and structure and enabling environment



- Coscharis Farms is developing a diversified supply chain base to meet the demand of rice paddy for its rice mill facility with guaranteed offtake from SDM farmers. This report focuses on investigating the efficiency and financial sustainability of the in-grower segment (left diagram) by comparing it with the other three sourcing options (in-growers, Coscharis own farm and open market). Coscharis owns and operates 2,500 ha of commercial rice farming from which most of the rice to supply the mill is currently sourced.
- The size of the in-grower program will increase throughout the five years horizon, with each farmer provided with plots of 2 ha that have already been cleared and landscaped by Coscharis. Coscharis will also reach ~15,000 out-grower farmers within 5 years as part of the SDM. Rice paddy from Coscharis' own commercial farm acts as the base supply for the mill while paddy from the open market (baseline farmers) acts as a buffer in case of a supply shortfall.

Enabling environment

Farmers are impacted by several factors within their enabling environment. Most important are:

1. Pricing & competitiveness

The prices of paddy and processed rice are dependent on market forces, with rice prices fluctuating based on level of imports. The current ban on land-imported rice and high taxes for sea-imported rice have boosted rice domestic production and farmers' competitiveness.

2. Infrastructure

The road network in Anaku and Igbariam is poor, especially during the rainy season. This causes delays in the supply of paddy and crop damage due to incorrect timing of harvest. There is also a shortage of electricity resulting in high costs of irrigation and rice milling

Services delivered and farmer segmentation (1/2)

Service status

On-going

Design phase

Farmer training

- Coscharis Farms (CF) contracts third party extension officers to train agronomists (ToT).
- CF agronomists conduct quarterly trainings for in-grower rice farmers on the block farm both through workshops and demo plots.
- NIRSAL's extension officers conduct trainings for out-grower farmers in neighboring communities.
- CF agronomists train and supervise in-growers lead farmers, who provide training to farmers in groups of c.50.
- CF out-grower staff is in charge of monitoring that out-grower farmers receive the agreed services.

Mechanization services

- CF provides mechanization services (ploughing, harrowing and harvesting) to in-grower farmers on credit using its own farming equipment.
- CF deducts the mechanization fees from the paddy revenues due to the in-grower farmers at the end of the season.
- Out-grower farmers lease equipment on credit via their bank accounts. NIRSAL pays mechanization service providers upfront from the farmers' accounts.
- Loan repayment to the bank occurs through automatic deductions from paddy revenues at the end of the season.

Access to land and water

- CF develops the block farm through land clearing and levelling using its own farming equipment. Developed land is leased to in-grower farmers who repay the development costs over a period of 20 years.
- CF builds dykes and canals and provides irrigation services to in-grower farmers.
- CF deducts the cost of land development and irrigation from the paddy revenues due to the in-grower farmers at season end.

Farmers are segmented in this SDM:

Segment 1: Out-growers

Contracted rice farmers (guaranteed off-take). Out-growers cultivate rice on their land (rain-fed rice farming). Services to out-growers are delivered by a third-party aggregator (NIRSAL) that charges an aggregation fee to out-growers to access the services. Compared to segment 2, out-growers have less land, achieve lower yield, and realize one cultivation cycle per year (due to rain-fed).

Segment 2: In-growers

Contracted rice farmers leasing Coscharis' land located nearby Coscharis's mill facility. In-growers are managed directly by Coscharis staff. Additionally, in-grower farmers have access to an irrigation system that enables them to realize two cultivation cycles per year.

Services delivered and farmer segmentation (2/2)

Service status
- On-going
- Design phase

Planting material provision

- CF negotiates the provision of affordable and high-quality seeds to in-grower farmers.
- CF deducts the cost of seeds from the paddy revenues due to the in-grower farmers at the end of the season.
- Out-grower farmers purchase seeds from seed companies on credit via their bank accounts. NIRSAL pays seed companies upfront from the farmers' accounts.
- Loan repayment to the bank occurs through automatic deductions from paddy revenues at the end of the season.

Agrochemicals provision

- CF negotiates the provision of affordable, high-quality agrochemicals to in-grower farmers from third party inputs providers. These are provided to in-grower farmers on credit.
- CF deducts the cost of agrochemicals from the paddy revenues due to the in-grower farmers at the end of the season.
- Out-grower farmers access agrochemicals from inputs providers on credit via their bank accounts. NIRSAL pays inputs providers upfront from the farmers' accounts..
- Loan repayment to the bank occurs through automatic deductions from paddy revenues at the end of the season.

Access to finance

- CF facilitates credit access to smallholders through a risk-sharing agreement (Anchor Borrowers Scheme) by guaranteeing offtake of paddy.
- NIRSAL supports farmers to set up bank accounts with a PFI (participating financial institution) and gives farmers (both in-growers and out-growers) a loan for all rice farming costs that they incur at the start of the season.
- The bank reclaims the loan principal plus interests from incoming revenues to farmers' bank accounts at the end of the season.
- NIRSAL covers 70% of farmer defaults.

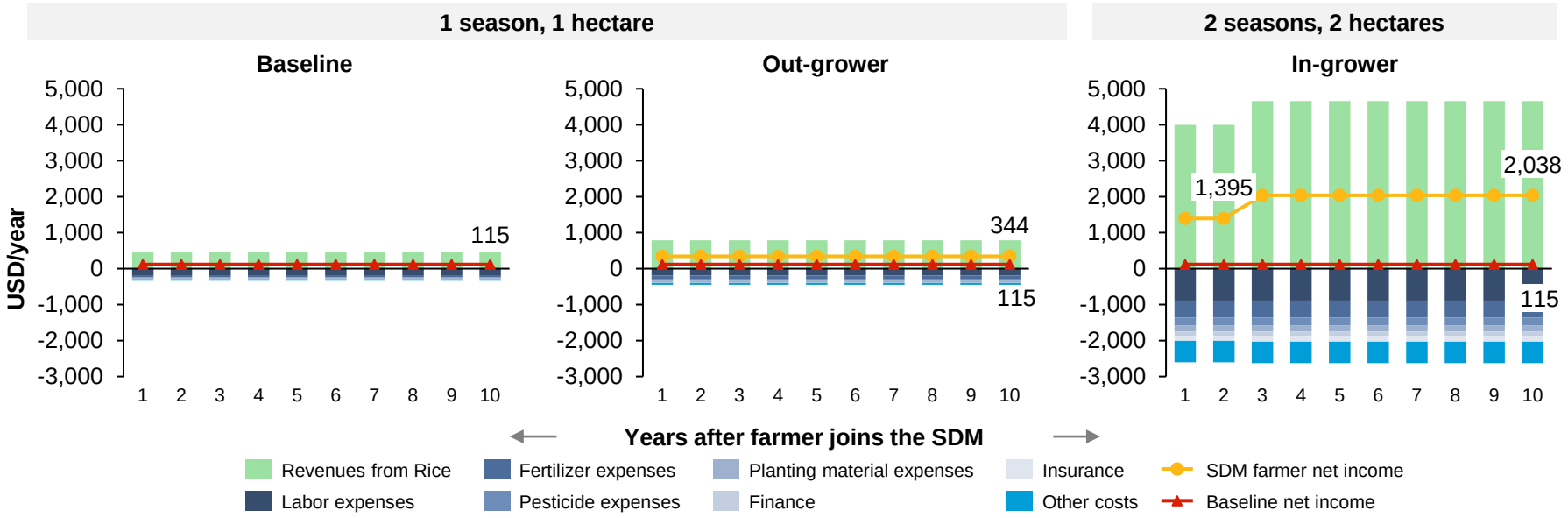
Access to insurance

- CF facilitates access to insurance by authorizing the bank to provide loans for crop and yield insurance premiums. Loan repayment to the bank occurs through automatic deductions in the same way as other services.

Farmer organization

- CF staff mobilizes and organizes farmers into farmer groups (300 farmers) through townhall events, building trust over time (both out-growers and in-growers)
- CF encourages groups to join the out-grower schemes and eventually the in-grower program.
- *Farmer organization and recruitment costs are included in the Farmer Training service*

Overall SDM impact: Farmer P&L



Economic sustainability at farm level

The above graphs show the P&L for baseline and SDM farmers. Baseline and out-grower farmers realize only one cultivation cycle (rain-fed rice farming), while in-growers realize two production cycles per year due to access to irrigation. Both SDM farmers are expected to earn more than a baseline farmer due to increased earnings stemming from improved yields (by adopting GAP and applying high-quality seeds & agrochemicals). Similarly, in-grower farmers are expected to have a higher yield than out-grower farmers (additional 1 MT/ha per season) as a result of applying more fertilizers and higher adoption of mechanized labor. From year 3 onwards, in-grower farmers are expected to achieve their peak benefits from participating in the SDM, namely 2,038 USD for a two-hectare farm with two cultivation cycles enabled by access to irrigation. However, in case Coscharis won't be able to provide this service, the annual net income of in-growers would drop down to 1,019 USD.

Main revenue drivers

- **Yield:** Farmers can increase their yields by adopting GAP and applying high-quality agri-inputs. These improvements are expected to lead to an increase in sales revenues of 299% and 475% for out-grower and in-grower farmers respectively.
- **Access to water:** Irrigation is a key factor for increased income as it allows farmers to achieve two production cycles annually.

Main cost drivers

- **Labor:** Manual labor is the major cost driver for baseline and out-grower farmers (56%). Total labor costs for in-grower farmers are higher than the other segments (in absolute terms), but lower relative to its total cost (34%).
- **Agrochemicals:** While a baseline farmer applies minimal inputs, the purchase of agrochemicals represents the second largest cost driver for SDM farmers. Fertilizers represent 20% and 22% of total costs for out-growers and in-growers respectively, while pesticides represent 12% and 10% respectively.
- **Land lease:** Land leasing cost is the second largest cost driver for in-grower farmers (22% of total costs) (included in other costs).

Farmer resilience

Farmer annual net income (USD/year) for varying rice prices and yields, year 3 of the SDM

Baseline

Farm-gate price* (USD/ton) ↓	Yield (ton/ha) → 1	1.5	2.5	3.5	4.5	5.5
305	-43	100	386	672	958	1,244
319	-30	119	419	718	1,017	1,316
333	-17	139	452	764	1,076	1,389
361	9	179	517	856	1,195	1,534
388	36	218	583	949	1,314	1,679
416	62	258	649	1,041	1,432	1,824
444	88	297	715	1,133	1,551	1,969

Out-grower

Farm-gate price* (USD/ton) ↓	Yield (ton/ha) → 1	1.5	2.5	3.5	4.5	5.5
305	-151	-8	278	564	850	1,136
319	-138	12	311	610	909	1,209
333	-125	32	344	656	969	1,281
361	-98	71	410	749	1,087	1,426
388	-72	111	476	841	1,206	1,571
416	-46	150	542	933	1,325	1,716
444	-19	190	608	1,025	1,443	1,861

Current projection

Poverty line**

In-grower

Farm-gate price* (USD/ton) ↓	Yield (ton/ha) → 1	1.5	2.5	3.5	4.5	5.5
305	-1,282	-693	485	1,663	2,841	4,019
319	-1,228	-613	619	1,850	3,082	4,313
333	-1,175	-532	753	2,038	3,322	4,607
361	-1,068	-372	1,020	2,412	3,804	5,196
388	-961	-211	1,288	2,787	4,286	5,785
416	-854	-51	1,556	3,162	4,768	6,374
444	-747	110	1,823	3,537	5,250	6,963

Sensitivity of farmer income

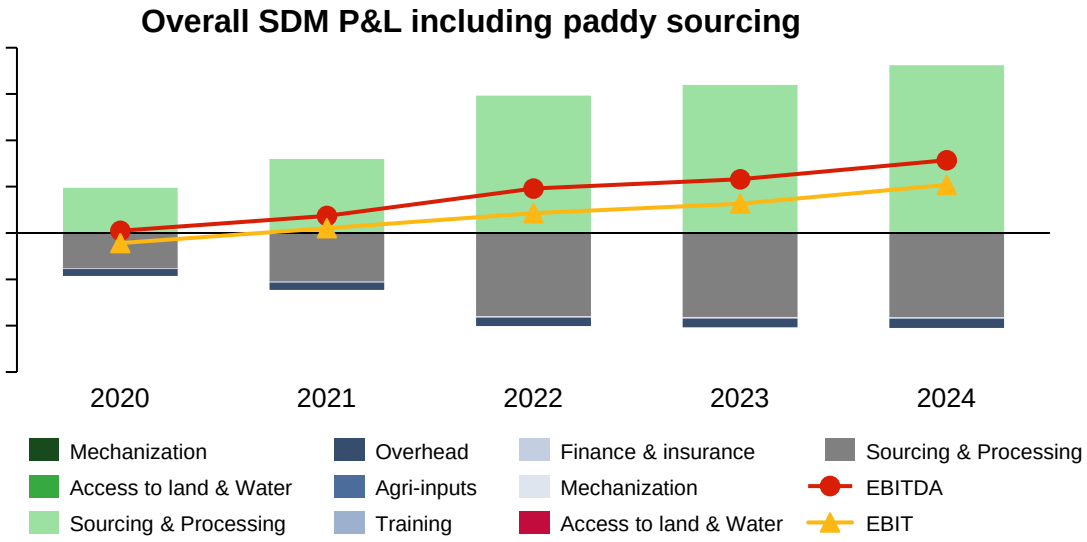
- The tables show the sensitivity analysis of baseline and SDM farmers' net income in year 3 (2022) at varying rice price and yield levels. The red boxes represent the expected annual net income based on this study. Year 3 was chosen because yields are assumed to remain constant from that year onwards.
- Due to the high instability of rice prices, the sensitivity analysis covers a wide ranges of price levels[1]. The yield ranges from drastically low yields (1ton/ha) to the yield levels expected in Coscharis' farm land (5.5ton/ha). In-growers' sensitivity analysis show the attainable annual net income for a two hectare rice farm over two cultivation cycles (due to access to irrigation).
- The PPP-adjusted poverty rate in Nigeria is 1,273 USD/household/year**. Under current assumptions, only in-grower farmers will be able to earn an income above the poverty line from their rice farming practices. However, it is important to highlight that the majority of SDM farmers have additional sources of income from other crops, livestock, or other non-agricultural businesses[3] (see page 11). Coscharis works with farmers from different regions. Outside Anambra, farmers are expected to earn more from non-agri activities as rice farming is a side business. The purpose of this sensitivity analysis is to show whether SDM farmers can earn a net income above the poverty line exclusively from their rice business.
- Besides the benefit of having double land size, in-growers' main gain comes from access to irrigation, which enables two cultivation cycles throughout the year. At current prices, out-grower farmers will achieve an income above poverty line only with an average yield of 5.5 ton/ha, which is very unlikely due to lack of direct support from Coscharis and significantly lower mechanization levels.
- To achieve the highest impact, Coscharis will have to put close attention to yield improvements throughout the years for in-grower farmers. At the current price, a yield of 2.5 ton/ha would not be enough for in-grower farmers to earn an income above the poverty line. This might cause farmers to drop the block farming scheme, reducing the impact generated by Coscharis on farmers' livelihood. On the other hand, it is imperative for Coscharis to encourage out-grower farmers to explore effective diversification strategies, to focus on agricultural expansion, or to ensure more adoption of mechanization in order to increase their net income.

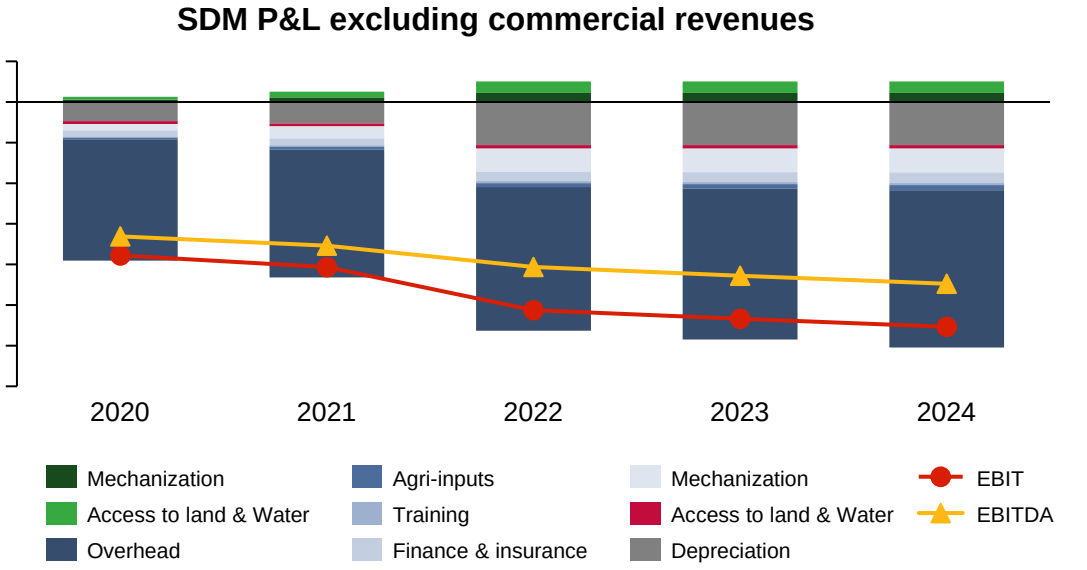
* This farm-gate price is a projection assuming that the rest of the value chain will keep the same margins under fluctuating rice market prices.

** Based on the international poverty line of 1.9 USD/capita adjusted using the PPP conversion factor for Nigeria[2] and assuming 6 household members[3]. This assumes that rice is the only income source of the entire household.

Sources: 1) Coscharis rice price range data 2) World Bank (2018), Online PPP database, private consumption 3) Primary data collection

SDM P&L





SDM sustainability including paddy sourcing

- The SDM is expected to become profitable only when considering revenues from commercial activities. Taking into account depreciation of assets (EBIT), Coscharis is financially strapped in the short-term due to large sourcing and overhead costs and reaches a positive annual net income from year 2021 onwards.
- Under current assumptions, the SDM is expected to reach breakeven in 2022 due to economies of scale and EBIT increases throughout the 5 years. The scale up in number of SDM farmers and improvements of yields are two major factors for this increase in cost efficiency.
- Rice is sourced from Coscharis' own farm, in-growers, out-growers and the open market. A maximum of 10,000 tons/year of rice is assumed to be sourced from the open market[1].
- The SDM runs at a loss if commercial revenues are not considered.

Main revenue drivers

- The main revenue driver is the margin on sales of rice. Other minor revenue drivers are provision of mechanization to in-growers and farmer payments for land leasing.

Main cost drivers

- Coscharis does not directly offer services to out-grower farmers (which represent more than 95% of the SDM farmers). Hence, SDM costs are mainly related to in-grower farmers. However, under the current in-grower growth strategy, service provision costs are significantly lower than Coscharis' operational costs. In fact, Coscharis' farm operational costs and processing expenses are the major cost drivers of the SDM.

1) Coscharis Farm Limited presentation document

SDM outcomes and main learning questions (1/2)

These are not an official assessment of SDM success or failure by IDH or NewForesight, but an indication based only on the analysis done in this forward-looking study, and on assumptions provided by the case owner(s). Actual assessment of success of the SDM should be conducted during and after the SDM is conducted using measured results

SDM objectives	Projected outcomes
1 **Secure a reliable supply of the right quantity and quality of paddy rice for the current and upcoming rice mill(s)**	• Higher mill capacity utilization • Contribution to local food processing and food security
2 **Implement in- and out-grower programs to supplement Coscharis Farms' production and improve local smallholders' livelihoods**	• More robust and diversified paddy sourcing strategy • Improved farmer livelihoods

Learning question	SDM insights
What are the costs and associated risks for the different sourcing options?	• Coscharis aims at establishing a diversified sourcing strategy to ensure the required rice volume and quality for its mill operations. Rice is sourced from Coscharis own farm (located 15km from the mill facility), out-grower farmers, in-grower farmers (currently in design phase), and from the open market. Coscharis farming activities have been found to be the most cost-efficient rice farming system. Although Coscharis farm has higher labor and input costs due to the implementation of more intensive agricultural practices, its economics of production is the lowest mainly due to the higher yields achieved. • In terms of cost of sourcing, the open market is the least expensive option. Although sourcing from the open market is the least expensive option, Coscharis would have the risk of unpredictable sourcing volumes and unknown quality of the paddy. This reduces the control of Coscharis over its supply base while at the same time affecting financial stability of Coscharis. On the other hand, sourcing from in-growers would be more costly than from the open market. However, having farmers concentrated in one area (in-grower model) gives Coscharis the opportunity to reduce salary staff costs by allocating more farmers per field officer and at the same time to have higher control over the production and the quality of the rice, which in turn increases the efficiency and robustness of the model. As compared to out-growers, Coscharis can source rice two times a year from in-grower farmers due to the benefits of access to irrigation. • Due to the large reliance on its own farming operations, Coscharis bears a high risk of business failure. Extreme weather events or sudden spread of pests & diseases can hinder the financial profitability of the entire model. For this reason, Coscharis is spending large amounts of economic resources on insurance of its farming activities. However, the insurance coverage would not cover the full economic losses in case of external shocks. Hence, it is crucial for Coscharis to leverage other sourcing strategies in order to hedge the risk of crop failure of its own farming operations. If no rice is sourced from the other sourcing options, Coscharis is expected to run the mill at low utilization capacity, reaching the 90% mill capacity target only by year 3. Moreover, Coscharis is planning to build a second mill, which would increase the rice demand to 64,000 MT/year (to run both mills at 90% capacity). Even by expanding its land to 5,000 ha, Coscharis is expected to not be able to reach the 90% utilization capacity target. It is therefore crucial for Coscharis to invest in both the SDM models in order to increase the efficiency of their operations and maximize profit by operating the mill at full capacity.

SDM outcomes and main learning questions (2/2)

These are not an official assessment of SDM success or failure by IDH or NewForesight, but an indication based only on the analysis done in this forward-looking study, and on assumptions provided by the case owner(s). Actual assessment of success of the SDM should be conducted during and after the SDM is conducted using measured results

Learning question	SDM insights
2) Is the SDM financially sustainable in five-years period?	• Without considering revenues from sourcing, the SDM does not recover the cost of service delivery. Revenues from service payments are related only to services delivered to in-grower farmers. In-grower farmers are located on Coscharis own land. Hence, in-grower farmers pay for access to land and irrigation and for mechanized labor (carried out with Coscharis' own equipment or by third-party service providers). Over the five-year period, the cumulative revenues from service payment from in-grower farmers represent only a small portion of the total revenues of the model. • Due to the high reliance on its own farming and processing activities, the model is highly capital intensive. Coscharis' requires heavy investment in farming and processing machinery. In fact, considering depreciation of assets (EBIT), Coscharis is financially strapped in the short-term due to large capital investment and overhead costs and reaches a positive annual net income (EBIT) from year 3 onwards. Under current assumptions, the SDM is expected to reach breakeven (EBIT) in 2022 due to economies of scale. Commercial revenues represent the majority of the SDM revenues.
3) What is the impact of the SDM on farmer's income?	• The major economic benefit for the farmers is the additional income from increased yields and ensured access to market. Due to the adoption of GAP, use of mechanized labor, and appropriate use of high-quality agro-inputs (seeds and agrochemicals), out-grower and in-grower farmers are able to increase their income from $115 USD/year to $344 USD/year and $2,038 USD/year respectively. The higher income generated by in-grower farmers is due to a larger land plot (2 hectares compared to 1 hectares for out-growers) and to access to irrigation that enable two production cycles across the year (out-grower farmers realize only one cultivation cycle through rain-fed rice farming) (see page 33 for more details on revenue and cost drivers of farmer's income).

Key insights

Key drivers of success

- Establishing an efficient and effective in-grower model is a key enabler of improved SDM performance and contributes to higher adoption and loyalty rates. Coscharis will ensure this by:
  - Providing farmers training free of charge, closely supporting them in their agronomic practices with tailored recommendations
  - Guaranteeing rice off-take through contractual commitment
  - Leveraging its investments in farming machinery and irrigation systems to provide farmers with access to land and water, which enables two production cycles annually
- The high level of insurance coverage is a key driver of success for Coscharis since the majority of the rice sourced will be produced on Coscharis farmland.

Key factors in replication

- Coscharis is adopting a holistic approach by diversifying its sourcing strategy into different segments. This contributes to mitigating the risk of crop failure from its own operations and at the same time establishing a flexible sourcing mechanism that increases the resilience of Coscharis' operations.
- Access to irrigation is a key factor for the replication of the model. Having access to water allows for two cultivation cycles annually. This translates into Coscharis being able to double the rice volume sourced annually while at the same time generating higher incomes for in-grower farmers.

Key risks

- Within Coscharis there is a low level of internal alignment and divergent visions on the value of an in-grower model. This could steer Coscharis to focus on the out-grower model, which is less reliable and generates a lower social impact.
- Coscharis has limited control over the out-grower model, as they externalize service provision to third party aggregators. Moreover, the Anchor Borrowers Program by NIRSAL does not have an exclusivity clause and therefore side-selling could be very high.
- A delay in the on-credit payment from the financial institution could hinder the timely provision of agri-inputs. To avoid this, Coscharis must closely monitor and coordinate the loan application process.
- If the governmental rice import ban is revoked, Coscharis farm and SDM farmers would face a stronger price competition that could pose risks on the sustainability of the business case.

Opportunities for improvement

- Under current growth assumptions, it is not attractive to invest in an in-grower model as it only generates a small portion of the total volume sourced. Coscharis could reconsider the size of land to be allocated to the in-grower model in order to make it a relevant sourcing option in the future.
- Coscharis would benefit from investment in its internal team to design and operate both SDM models successfully. A dedicated and knowledgeable team is needed in order to cover all activities involved in the delivery of the services and in making sure that farmers receive loans and inputs on time.
- Coscharis could consider to provide transplanting as an additional service to in-growers. This can significantly increase yields and therefore improve the efficiency of the SDM.

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For more information and insights on SDM's, see the IDH Smallholder Engagement Report