



Okavango river; Namibia, Angola ©ESA

Space for Food Security

Opening and stimulating an emerging market

Part 2: Sustainable business models and scaling (Summary Report)

This report has been commissioned by the Netherlands Space Office and supported by the Ministry of Foreign Affairs in the framework of the G4AW programme.

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Potato harvest Mavo Diami project, Angola



Foreword

Smallholder food systems must be made more resilient to future shocks such as floods, droughts, and disease. Urgent and sustainable increases in food production are needed to reduce reliance on food imports and reduce poverty, and this is where digital services come into play. Digital services are the gateway to farm loans, crop insurance, and greater economic security, which in turn enables farmers to increase their resilience to climate change by experimenting with new, drought-resistant crops, for example, or innovative farming methods. Text messages with weather reports help farmers make better decisions about when and what to plant, and when to harvest.

With mobile phone ownership in Sub-Saharan Africa alone expected to reach half a billion in 2021, digital services offered via text messaging can reach even the most remote village. And at least one-fifth of these phones also have smart features, meaning they can connect to the internet. However, on the African continent only 13-35 percent of farmers currently use digital solutions. Core digital and data infrastructure is still lacking and the digital literacy of smallholders and extension providers can be low. In addition, private sector involvement is limited due to investment risks, barriers to scaling services and insufficient knowledge on sustainable business models.

Yet transforming food systems digitally has demonstrably excellent results: the African Development Bank, which has allocated over half of its climate financing to adaptation since 2019, has already helped 19 million farmers in 27 countries to lift yields by an average 60 percent through applying digital technology. Once developed, the digital nature of these services often makes such projects easy to replicate elsewhere and scale, even across large rural areas with little existing infrastructure.

This is why the Global Center on Adaptation and the African Development Bank have launched the Africa Adaptation Acceleration Program (AAP) to mobilize \$25 billion to scale up and accelerate innovative climate-change adaptation across Africa. Its Climate Smart Digital Technologies Pillar aims to scale up access to and uptake of digital solutions for 30 million smallholders in Africa by 2025.

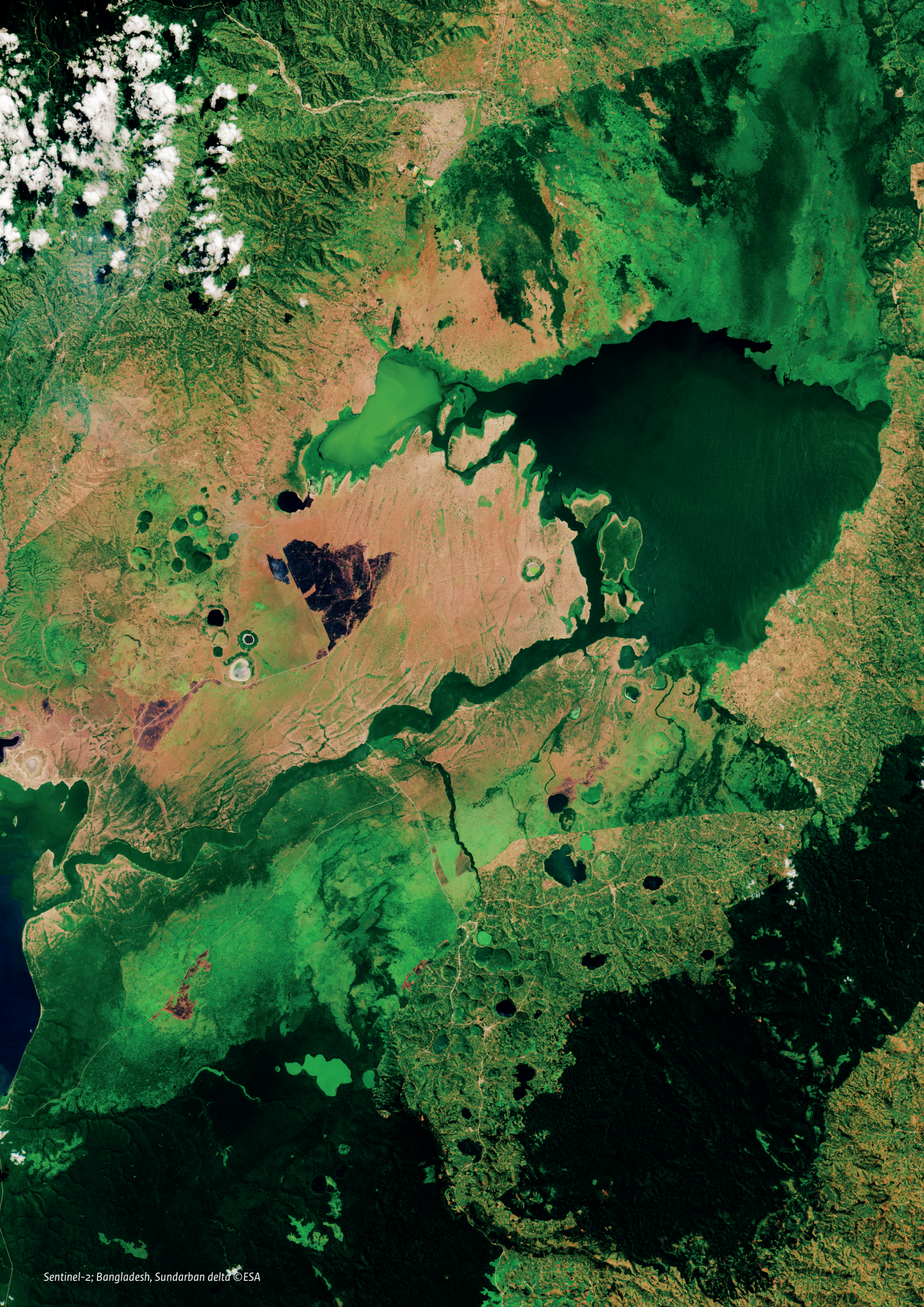
The work of the G4AW Facility in Africa and Asia, and the lessons shared in this report, are a valuable resource on how to leverage the opportunities that geodata and digital or data-enabled tools provide. We have the means and the technical capability to put smallholders well on the way to achieving food self-sufficiency and greater climate resilience. In doing so, we can help millions move out of food poverty. We must not squander this opportunity to create truly historic and lasting change.

Patrick Verkooijen
Chief Executive Officer
Global Center on Adaptation

Abbreviations

B2B	Business-to- Business
B2C	Business-to-Consumer
CRL	Commercialization Readiness Level
CSR	Corporate Social Responsibility
GSMA	Global System for Mobile Communications Association
G4AW	Geodata for Agriculture and Water
ICT	Information and Communications Technology
NSO	Netherlands Space Office





Introduction

This document provides a summary of the second of two publications with lessons learned from the G4AW Facility. The G4AW Facility was launched in 2013 with the objective of creating digital advisory services for smallholders, based on the use of satellite data. The first document provides information on the background of the G4AW Facility, as well as the objectives and envisaged outcome, among other things. The first document focuses mainly on the design and development of the G4AW services. This includes the design process, the focus of services provided, targeted crops, commodities, the clients' countries. As most projects are moving towards the final business stages or have already been finalized, this information is readily available, which makes it possible to provide a clear overview of many of the decisions made by partnerships during the project phase, including those focused on non-business matters.

This second publication focuses on the business-related decisions and the steps taken to move towards a sustainable business model and scale to other services and regions. The main challenge of compiling this report was to differentiate the *plans*, *potential* and the current *practice* from each other. Some partnerships have already completely abandoned their business orientation, while others have taken major steps towards becoming financially sustainable.

Only several years after the project's completion will it become clear whether these partnerships have succeeded. This is an important disclaimer to this report: we present observations. These are insights into the steps taken, underlying reasoning, and future plans. At this stage, we cannot give a clear roadmap as each service is unique and more time will be needed to draw robust conclusions. However, we provide recommendations based on common denominators.

We hope that the information contained in this report will help policymakers, (impact) investors and providers of digital advisory services in the agricultural sector understand the challenges faced by the G4AW partnerships and learn from their experiences and use the lessons learned to create a sustainable business.



Maize farmers in Kenya ©G4AW Geodatics project

Why focus on creating a sustainable business?

A 2012 analysis by the Netherlands Space Office (NSO) of over 250 research and demonstration projects on digital and geospatial innovation in the agricultural sector showed that most activities ended when project funds were spent. Although research funding included funds for development, none were made available for future operations, nor did supporting governmental agencies provide any. The G4AW Facility started in 2013 with the ambition to support the development of digital advisory and/or financial service provision using satellite- and other geodata. Each project's objective within this Facility was to reach 100,000 smallholder farmers (or 50,000 pastoralists, fisherfolk) and create a sustainable business case.

The most important reason to make the development of a sustainable business case one of the main objectives of the G4AW Facility was to ensure the financing of long-term service provision. As G4AW was one of the early adapters of digital advisory services (using satellite data) for smallholder farmers in the agricultural sector in developing countries, opening

new markets was a key focus. Being one of the first programmes to introduce smallholders to the potential of satellite data for improving their livelihoods, farmers still needed to be convinced that they would receive *continuous service* rather than just being given advice during a 'short' project. This would help convince smallholders of the potential, paving the way for large-scale uptake of digital services both in the G4AW programme and beyond.

A second important reason why the business focus was so important in the G4AW Facility, is based on the assumption that this would empower smallholders. By being a customer, smallholders would have a stronger voice in the key focus areas of the applications. Not only the initial user needs, but also emerging ones (such as new solutions needed to deal with the COVID-19 situation), would have to be taken into account, as the service provider needs to retain smallholders as clients.

A final reason for the focus on sustainable business models is that this was expected to attract different types of innovative (technology-oriented) companies, including start-ups. There is generally a difference between project-oriented companies (research, consultancy) and product-oriented companies (ICT domain, such as application and platform developers). Product-oriented companies are regarded as a crucial player in G4AW, as they have experience with digital design and can ensure a good user experience. These parties are generally not interested in working on a short-term consultancy basis, as their business model is based on selling subscriptions and licenses. A strong focus on the sustainability of the 'G4AW' business model helped convince these parties to leave their comfort zone of well-developed markets and contribute to these important innovations in a developing market.

Willingness to pay

While smallholders are central to most of the objectives of G4AW, it was assumed from the outset of the G4AW programme that smallholders would have only a limited capacity and willingness to pay for the services, e.g. 5-10 euros per year (<1% of annual income). Many projects carried out assessments of the willingness to pay, which varied greatly between countries, target groups and type of services. Even if smallholders were willing to pay, they were generally only prepared to pay a limited amount that by itself was not sufficient to recover costs in the first years. Other challenges related to having smallholders as paying customers is that there is often competition from free (donor-funded) alternatives and that farmers often have difficulty accessing funding.

An example of a service for which it is often very difficult to find paying smallholders is the provision of weather information. This is because potential clients often see it as responsibility of the government¹ and can easily share the information within their community. Another example is the willingness to pay for plot-level advice. The problem is often that there is a certain inaccuracy in the models, especially in the early stages when there is not yet sufficient information available from farmers to calibrate and verify the advice provided. To ensure advice can be verified, free trials are generally provided in the early stages of the model. A downside of this, however, is that farmers become accustomed to the free

services and are no longer willing to pay for the services once the trial ends.

In several G4AW projects, the cost of the services has been included in other services (tangible products such as fertilizers, or intangible products such as insurance). In this way, farmers are not fully aware that they are paying customers and see the service as free, increasing satisfaction.

Partnerships

The average number of organizations per G4AW partnership is over five. This does not include third-party contractors which deliver specific services to the partnership. Each partnership is unique, although many organizations have been involved in more than one project. Each partner had a clearly assigned role and had to decide in what form they wished to continue after project ended. Only if a partnership is rewarding for all partners involved can it be considered healthy. This means each partner has to contribute towards and benefit from the creation of shared value.

Many research organizations were involved in the first call of G4AW which means the knowledge-related assets were very well represented. In the second call, NGOs have taken on a more prominent role: they contribute a knowledge of food producers, trust, goodwill, and generally media channels, as well. The third call of G4AW has attracted more interest from business partners and service providers that can contribute an entrepreneurial mindset, funding, and scale.

New partners are frequently added to fill gaps that the partnership has encountered. Over 90% of G4AW partnerships have established new business partnerships with organizations outside of the original consortium. There were various reasons why these new business partners were onboarded by the G4AW partnerships, which ranged from the opportunity that the new partner provides to scale up and bundle the service, to assistance with service delivery, and provision of financial services. There is a particular interest in finding new partners that can develop services for inclusive financing (e.g. credit risk scores), as it is assumed that this will attract more interest from financial institutions in B2B models.

¹ It is noted that weather information provided by governments is generally not specific enough to serve as a basis for smallholders to make decisions in their daily activities.

Success of services

In order to reach a large number of smallholders, their needs should be addressed in a satisfactory manner. That means that the advice should be actionable, accurate, and inclusive (also reaching marginalized communities, women, and youth). This is based on a continuing user design trajectory that promotes digital inclusion. This user centered design is discussed in part 1 of the publications setting out the lessons learned. There are many barriers to the uptake of digital services in the agricultural sector that have to be considered by the partnerships.

The services need to meet a clear need, and also provide sufficient tools to take action. For example, the uptake of nutrient advice will be limited if the recommended blend is not available on the local market and farmers cannot access the funding needed to be able to afford these. Financial access has been identified as the most important restriction, and many partnerships have either implemented tools

to promote financial access (by adding farmer risk scores to their services to attract interest from inclusive finance institutions), or are identifying ways in which they can add such financial features in the near future.

Another key barrier to service uptake relates to the service delivery methods. While very basic and easily accessible tools such as radio and basic phones can be used to deliver the services, they generally limit the options for business models. Especially when it comes to accessing financial services, the more advanced service delivery methods (apps, internet) have more potential. The decision partnerships have to make in these situations, is whether they want to offer their desired optimum service (for which they see the best business opportunities), or reach the largest potential customer base and hope that the business potential can also be met with a more basic service offering.



The G4AW partnerships are well aware that not all of their services are equally appealing to all the target groups they serve. Most partnerships understand that multiple target groups could potentially benefit from their services, including smallholders, medium and large farmers, food processors, input and food retailers, banks and other finance or insurance companies, governments, and NGOs. However, across the board, certain services are considered more valuable than others.

Many G4AW partnerships believe they add the most value through the provision of their accurate weather information and crop management advice. When it comes to localized weather information, this is because it serves as the basis for many different services, and can be used by almost all smallholder segments. This provides the largest potential customer base (especially when the focus is on selling services B2C). Crop management advice is highly valuable as it is relevant to both smallholders and businesses. For farmers, this is the information that helps them increase yields. For businesses, this can be used for market intelligence, logistics planning, yield prediction, creating farmer profiles, and more. These more general service categories are highly relevant to different stakeholders, hence they yield the best benefit to cost ratio. Reducing costs is also often considered by the partnerships.

Service optimization

Service optimization is the process of adding value to the product, while keeping operational costs to a minimum. The most frequently-used solution to increase benefits is bundling services. This is an option for optimizing the services and increasing their appeal for more target groups. Bundling can be done in many different ways (see box).

Over 80% of the G4AW partnerships indicated they have implemented cost-saving strategies to optimize the economic viability of their services. Strategies mentioned were:

1. collaborating with other parties to share costs of, among other things, marketing and farmer training,
2. optimizing the number of personnel in the core team,
3. using open data instead of paying for data,
4. replacing existing service providers with more affordable ones, and
5. scaling the service to more farmers and other users to achieve economies of scale.

Business models

In this publication, we distinguish the business case from the business model. When it comes to business models, we mainly focus on the underlying theoretical approaches to generating revenues. At the highest level, these can be divided into business-to-business (B2B) and business-to-consumer (B2C) models. These models can be subdivided into a wide range of sub-models, such as subscription models, freemium models, and inclusive (retailer) models. The business case is the practical application of (a blend of) business models at the product/service level, including costs of marketing and operations versus revenues. This not only covers the different business models that are applied, but also plans to optimize and reduce costs and scale to a sustainable business. This is what attracts (impact) investors and it is generally highly specific to a certain product.

Bundling within the same service type: The most basic approach that many partnerships have taken is to use the same datasets to provide different types of advice to farmers. In this way, basic datasets such as weather information and a vegetation index are used to create a large 'bundle' of agronomic advice that meets needs of different segments of smallholders.

Bundling services covering different parts of the agricultural value chain: This can consist of combination of agronomic advice with for example market intelligence, crop insurance, or access to funding. This will increase the actionability of the advice, as most of the challenges faced by smallholders are addressed. In many cases, smallholders cannot invest because they lack access to funding, or will not invest because they lack insurance coverage if the new technology does not produce the desired results.

Bundling with services outside of the agricultural value chain: A final approach to service bundling is to add services that cover aspects outside of the agricultural value chain. For smallholders, the agricultural sector lies at the centre of their day-to-day activities and is their primary source of income. They are, however, also interested in and influenced by activities in different sectors. This includes health information, financial planning, and more.

The objective of G4AW was to have a sustainable business by the time the project has ended (after 3-4 years). Sustainable means that the costs of operations are paid from operating revenue; it does not include investments for new functionalities and the scaling up of the services. The main reason for this target was that support from the initial funding agency (Netherlands Ministry of Foreign Affairs) would no longer be available, so in order to ensure continuity, the benefits at the end of the project should be equal or greater than the costs (or own/private investment has to be increased).

A common problem among G4AW projects was that the minimum viable product was generally only ready in the final stages of the project, and consequently there were not that many paying customers at the time the project formally ended. This is why many of the projects tried to significantly reduce operational costs and added a B2B model to generate revenues that were less dependent on the number of paying users.

B2C models

The two most common business models for B2C services in G4AW are pay-per-use and subscriptions. Food producers pay for the advice they receive (e.g. calls to call centres in MODHEM/STAMP) or pay a (monthly or annual) subscription fee to receive agronomic advice and weather information. In most B2C models, there is also a B2B component that either helps lower the costs for farmers, or adds a discount on products to make the service more interesting. For example, in MODHEM, the operator of the service (ORANGE) pays for the operations in the call centre. In SMARTseeds, the subscription is made more interesting for farmers by adding a B2B component in which an agribusiness provides a discount on certain products to farmers who have a subscription to the service. This helps the company by offering new products, or products that are not yet selling well, to farmers.

Some business models are based on a hybrid business model (freemium model), in which farmers get a certain



Agro-pastoralist in West Africa ©SNV



MODHEM partnership in Burkina Faso

basic set of (subsidized) functions for free, and have to pay an extra fee (pay per use or subscription) for additional features. For example, the CROPMON project in Kenya applies a freemium model to create a larger user base. Farmers receive a free weekly weather service, and can subscribe in order to access premium services (advice on soil and fertilizer, crop monitoring, pests and diseases, GAP and finance literacy) for a small fee.

B2B models

B2B models are much more diverse than B2C models. This is because the value of the service is seen in a wider perspective. Customer loyalty (retention), risk mitigation, certification, and corporate social responsibility are also of significant value. B2B services can generate revenues in various ways: one-time advertising, a basic subscription, or a flexible premium based on sales. The most-frequently used B2B business models in G4AW are:

- **Loyalty** model: free service provision (as an add-on to another paid product or service) to prevent clients switching to a competitor;
- **Inclusive** (retailer) model: the service is bundled into a package with other services and sold as an integrated set (e.g., insurance coupled to credit, advice on good agricultural practice to input supplies).
- **Service** model: the customer pays a (subsidized) fee or no fee at all for the provision of services, and another stakeholder (government², CSR foundations of large corporations) assumes some or all of the costs.

Business challenges

The most important business challenge is to create a stable flow of income. Even if the product is highly optimized from a cost perspective, income has to be generated. There are many reasons why **generating a stable income** has been a great challenge in the G4AW partnerships. Some key underlying reasons are the difficulty of retaining customers, the unclear business commitment and increased competition.

Customer retention

Retaining customers has proven a key challenge in G4AW partnerships. While uptake has generally been considerable (based on the number of smallholders informed on the service and/or app downloads), gaining return customers is still a challenge. This is, in part, simply due to the fact that it is currently difficult

to monitor these parameters: many partnerships struggle to accurately separate total number of users, unique users, return users, and other indicators that provide insight into the reasons for a possible increase or decrease in the customer base. Without advanced tracking or pay-per-use system, it is unclear how actively farmers are using the services. In the case of mobile apps, there is a lot of competition for the limited storage space on feature phones. The problem with many of the services is that they are only relevant in certain periods due to the seasonal nature of agriculture.

Another key problem is ensuring sufficient ease of use. This not only relates to the interface of the app (local language, clear icons), but also to the availability of offline features and the provision of actionable advice. The availability of internet coverage in remote areas was often initially overestimated, creating the need to add new features. Finally, the role of agricultural extension officers and/or an information and training campaign are crucial for retaining customers, as well. An increasingly insecure situation (Mali, Burkina Faso, Ethiopia and Myanmar) creates additional challenges for retaining clients.

Business commitment

Around 90 percent of G4AW partnerships have managed to establish new business partnerships with (large) organizations outside of the original consortium, which shows that they are willing and able to engage new partners. It is, however, difficult to fully assess their level of commitment. Many new businesses might be engaged as a temporary partner and not as a (future) paying customer. Several of the G4AW business leads mentioned that large corporations such as input suppliers and telecom operators were often more interested in sponsoring pilot activities (making their products/services available for free) than paying for a service for the longer term. It is therefore important that the business commitment of new partners is sufficiently clear to the G4AW partnership, and, where applicable, has also been formalized in a letter of intent.

Increased competition

One important business challenge is dealing with increased competition, and especially the ‘competition’ with free alternatives sponsored by donors or government agencies. On the one hand this is good news since this means that digital agricultural advisory services are attracting attention and funding, thereby accelerating innovation and scaling. On the other hand,

² Governments may subsidize agro insurance products, or may provide a grant/contract to co-finance the provision of services. This is done so that STAMP and MODHEM can continue operations after the project has ended. B2G business models are not used in G4AW.

however, this is confusing the (potential) customers and might make them switch from one app to another (free) app. There is even a risk that customers will become disillusioned by all these (new) innovations and will stop using them. Customer retention in this competitive environment is becoming a key business objective.

Business models created in G4AW

Most of the G4AW partnerships have started with the ambition to sell services within B2C models via designated existing service providers or new established social enterprises. Some services from G4AW partnerships are still being marketed as B2C. Most partnerships, however, have also added a B2B approach to ensure additional and more stable revenues. When asked which business approach would be more lucrative, about 75% of the partnerships said they expect to generate more revenue with B2B than B2C operations. Almost half of the partnerships said they are planning to adjust their business case and add one or more new business models to their existing ones to create a hybrid model.

The selection of a suitable business model is strongly linked to the type of services (e.g. financial services) offered, where (country) and to whom (target group) they are offered, and the way in which the service is provided (service delivery method). Some basic findings are that subsidies for the services are generally only available in Africa and for staple and vegetable crops. This applies in particular to insurance-related products and weather information. B2B models based on advertising and the selling of data for insight, on the other hand, are mainly used for services that provide agronomic advice for cash crops in Asia. Most of these relationships are easy to understand, but it is important that the partners are already sufficiently aware of what business models will or will not be suitable for their services early in the development phase of the project.

Many partnerships see selling of data for insights as the silver bullet to close the business case. Data generally only becomes valuable if the dataset is large, accurate, frequently updated and covers relevant information to a certain party. It is therefore important that the partnerships first identify whether data of their target group could be of interest to a certain institution, before investments are done in new services such as risk profiles. In different G4AW projects, new services are created before interest was concrete.

Commercialization

Several conditions must be fulfilled to achieve commercialization: a healthy partnership with clearly defined roles and entrepreneurial leadership; optimized services (service proposition in line with user demand); a good product-market fit (viable business case); and a functioning business model. Commercialization is the final push to bring these elements together and bring the product to market. This is the final transformation from partnerships to entrepreneurs. In 2020 NSO contracted Bopinc³ to conduct a survey to assess the commercialization readiness level of the G4AW partnerships.

Most of the business owners in G4AW who participated in the survey are fully convinced that they have created a desirable service proposition. When it comes to the business case, there is less confidence that it is viable, which is mainly related to the fact that the willingness to pay has not yet been sufficiently proven. Additionally, in many cases the most suitable business model has not yet been identified. There is also more variation in the response to the statement that the business owners possess sufficient entrepreneurial leadership. This is because several partnerships have not yet appointed an entrepreneurial team that will scale the service in the market. Some teams indicate they have an entrepreneurial lead, but require more competence building. Respondents from the G4AW projects in Asia generally give themselves higher scores for entrepreneurial leadership than those in Africa.

Sixty percent of respondents indicated they will continue to rely on grants and/or subsidies on premiums in the near future to finance their business development activities and the improvement of their services. However, 55% say that even when the service is fully ready and is launched in the market, they will continue to require grants as their service cannot be sustained on sales revenues alone. This shows that the market is still immature, the services sector is still in development and it is not likely that standalone business models will readily emerge. A combination of public/private investment (blended finance) will probably continue to be necessary over the coming years, until the market has become more mature.

At the time of the survey, project and business activities were often financed through a combination of the G4AW

³ Improving commercial viability of satellite-based services for farmers - Bopinc



Training farmers in Bangladesh to use the app. © G4AW GEOBIS project

subsidy and own funding (co-financing was a requirement of NSO). A few respondents mentioned that they accessed grants/subsidies from donors other than NSO. Only six projects mentioned they have started to finance part of their operations through sales of the newly developed service. The box below shows the top 4 barriers to the successful commercialization of digital advisory services for the agricultural sector, based on the experiences of the G4AW projects. Approaches to successfully overcoming these barriers are discussed in the main report.

Top 4 commercialization barriers identified:

1. Insufficient entrepreneurial leadership & lack of business competences
2. Insufficient user-centered design approach to transforming smallholders into happy and active users
3. Insufficient paying customers to ensure stable and sufficient revenues
4. Long-term reliance on subsidies, even when commercially launched in the market

Scaling

Scaling can be done either horizontally (expanding into new markets) or vertically (scaling products/ services inside an existing market). Within G4AW the most common horizontal scaling strategies reported by respondents are: adding new customer segments, and scaling into new countries. The most common vertical strategies are the bundling of services by either expanding their own offering or by integrating the services with those of third parties.

The scaling plans rely on various assumptions such as:

1. the availability of funding to finance the scale-up,
2. the availability of interested partners in other countries they want to scale in,
3. that replication will work at the same operational costs and using the same operational procedures, and (that there is enough demand and willingness to pay among the new customers they will identify.



“Pepper and Indonesia alone are not enough to sustain our business and growth. Exploring new segments and countries is needed to increase the importance of SpiceUp in the industry.”

SpiceUp, Indonesia

The reasons are thus highly diverse, and range from long-term strategic matters (one-stop shop) to an absolute necessity based on the selected (niche) crop such as pepper. Figure 1 shows what scaling plans are most frequently considered by the business owners.

Practical experience with scaling in G4AW

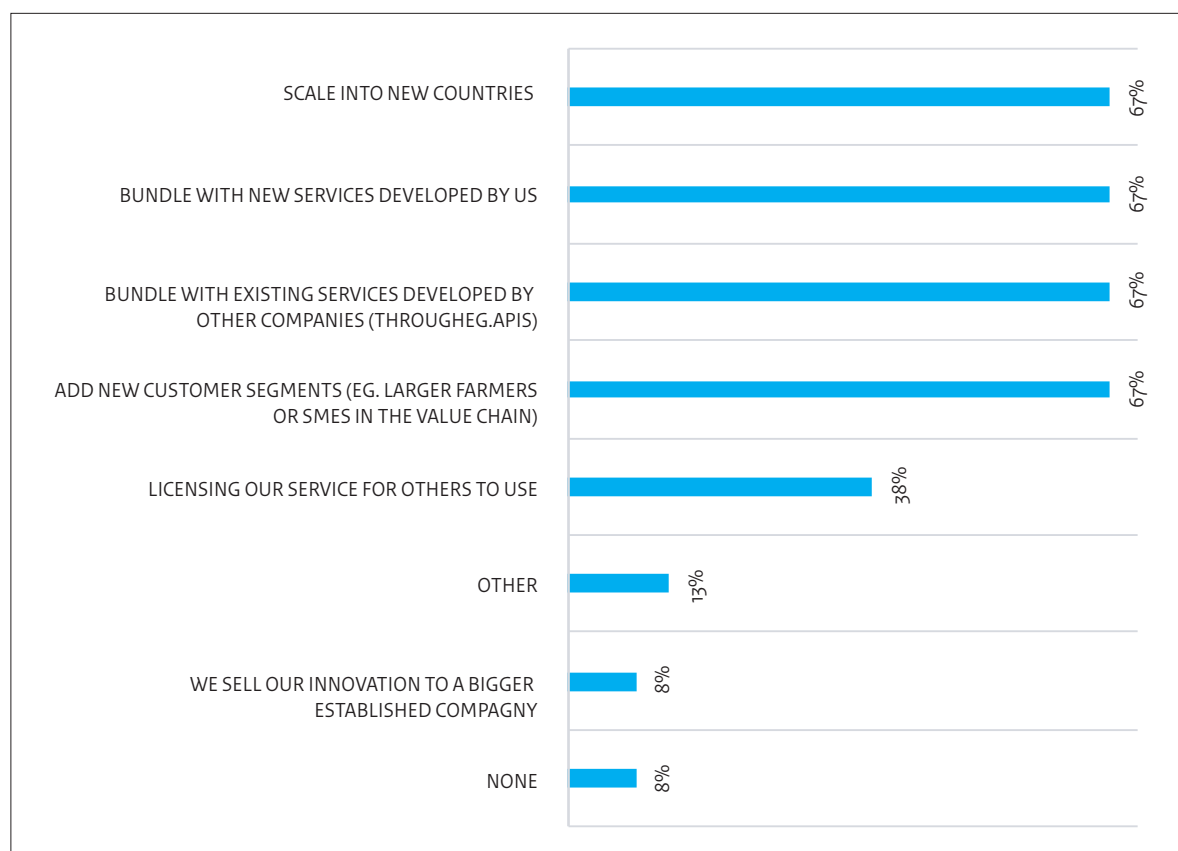
There is a lot of ambition among the G4AW programme partners when it comes to the scaling of services. Quite surprisingly, 67% of business owners already plan to scale to new countries. G4AW regulations did not allow for co-financing of such activities, so own or private investments and/or new grants are required.

An example of projects that successfully scaled are the projects of SNV for (agro-) pastoralists in the Sahel, which initially took place in Mali (STAMP) and Burkina Faso (MODHEM). Scaling of these projects has been done both vertically (adding financial services and new regions) and horizontally (introduction of Garbal

services⁴ via a new project in Niger from 2021). It should be noted, however, that additional subsidies from different development agencies, and not private (own or business) funding have made scaling possible for these projects. The main reasons for this additional (governmental) support are the need for functional and regional scaling, lack of security in the region, and the relatively low revenues from regular operations.

In order to scale to new countries, many G4AW partnerships have submitted proposals to other funding organizations. Different partnerships have also been able to do private funded (pilot) projects in other countries after the project has ended. For example, Sat4Rice has been implemented in Pakistan. The main challenge is that without access to subsidies, the financial risks of these projects are higher. The expectation is that services are ready (accurate and embedded in local systems) within a short period, while the assumption that replication of services in different

Figure 1 Scaling plans G4AW partnerships



⁴ <https://snv.org/update/garbal-satellite-information-service-pastoralist-farmers-northern-mali>

countries will work under the same operational costs and procedures has often been shown to be incorrect. The services have to be calibrated and validated in the new region, while embedding of the services in the product offered by the partner can also be time-consuming, especially if the practical experience with use of such digital tools is still limited.

This often results in an overambitious timeline provided by the partnerships, possibly resulting in friction with the new partners. Access to additional support (e.g. from governments) or willingness to make own investments will be important to successfully scale to new countries.



Recommendations

1. Creating a balanced and involved partnership

A successful partnership has to be rewarding for all partners involved. This means each partner has to contribute towards and benefit from the creation of shared value. It is important that the partners identify a resource or asset they can bring to the partnership, which can complement or enhance the resources or assets of other partners. It is also important to understand the reason why partners want to be involved to understand the timeframe of their involvement (short-term or sustained).

The roles and agreements (including on intellectual property and business ownership) need to be clarified and formalized to ensure a transparent cooperation process. A partnership needs to be flexible and be able to adapt to changing conditions.

2. Ensuring sufficient entrepreneurial leadership

Entrepreneurial leadership is one of the most important preconditions for commercialization and scaling of services. This entrepreneurial leadership has varied throughout the G4AW calls (limited in early calls, high in the most recent call). There is generally less leadership in the G4AW projects in Africa than in Asia. This can be increased partly through entrepreneurial competence building. But in all cases at least one of the partners should have entrepreneurial skills or be willing to take on the role of entrepreneurial lead and – if necessary – acquire sufficient entrepreneurial skills. This partner should preferably be located in the targeted country, or have its own business associates in targeted countries.

Many G4AW partnerships envisage the establishment of social enterprises, and a few have already done this. This will transform and formalize part of the partnership. This process, however, can be time-consuming and relatively costly. It is important that the partners begin this process early on in the project, to ensure that there is no (time and financial) gap after the project ends. Whether

a social enterprise is the right form depends on the type of product and the objectives of the business owner, so this is not relevant to all partnerships.

3. Optimizing services

Meeting the needs of many users (smallholder segments and businesses) can be done by bundling services, and by having a dynamic and easy-to-use front-end (e.g. app for smallholders, dashboard for business – see figure 2). Reducing costs can be done by collaborating with other partners, using cheaper or open data, and replacing international staff with local staff. The implications of these cost reductions need to be well understood to ensure that cost reduction does not result in a smaller user base (and even less revenue).

It is also important that the partnerships do not overestimate the (rate of increase in) network coverage and smartphone access. In different projects, significant costs had to be incurred to add more offline features, as farmers could not access online advice. While this is expected to improve in the near future, it is important to focus primarily on the current conditions, while keeping in mind future developments.

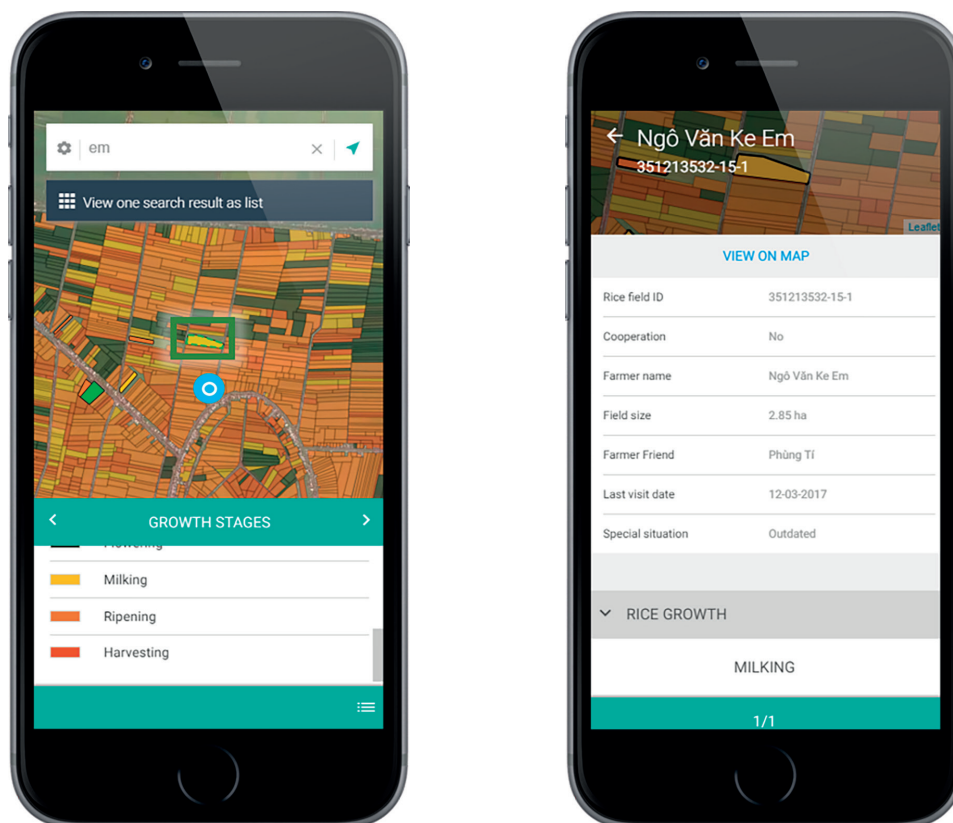
An additional challenge in the optimization of services is that the number of growing seasons for testing has been limited in most projects, as the minimum viable product is generally only ready in the third year. In addition, the organizations that would use and/or sell the services were often highly ambitious and not all of them were equally ready for digitalization at the level of using digital tools.

4. Financial services

The objective of financial services is to provide farmers with affordable insurance and other financial services that enable them to invest more in their farming activities, and thus increase their production and self-reliance. While geodata has been proven beneficial for the provision of financial services such as credit scoring⁵, the revenues are still relatively low and require scaling to be sustainable. Bundling financial services with

⁵ Reference to NpM Geodata for AgTech and FinTech; what have we learned?, March 2021

Figure 2 Sat4Rice mobile web-app



agricultural advice and/or risk management is advisable. Bundling with supply with agricultural inputs is also an option⁶.

5. Understanding the value of client and crop data

The G4AW partnerships have collected a lot of data. This includes, amongst others, the registration of farmers (and pastoralists), plot delineation and crop types. Quite late in the G4AW projects, many of the partnerships started to understand the value of this data. Farmer registration, for example, is of interest to financial service providers and agribusinesses. The data related to plot delineation and crop types is also of interest to businesses, but also holds a lot of value for research purposes. It is important that partnerships understand the value of data early on in the process, and ensure that data is complete

and validated. It should be well documented (metadata), and ownership of data and privacy concerns should be addressed. This will help make it valuable to B2B partners.

6. Understanding smallholder needs

Smallholder food producers, whether they be farmers or (agro)pastoralists, are the end users and beneficiaries of the services. In order for them to use the service, it has to be clear what challenges they face, and what options they have to solve these. It is important to understand the different user segments (gender, age, finance, specific needs). It is also important to understand what actions farmers are willing and able to take (user stories), and what products are available on the market (market study), to ensure that the information or advice provided is actionable.

⁶ E.g. as done by Pula and One Acre Fund



Extension officers (Farmer Friends) in a rice field in Vietnam ©G4AW SataRice project

7. Understanding the willingness to pay

The willingness to pay for each customer (B2C, B2B) has to be studied. In the projects that have included this in surveys, it was found that there is generally a certain willingness on the part of smallholders to pay for the proposed service. In some of these it was found, however, that smallholders – for numerous reasons – did not actually pay once the service was available. This means that understanding the willingness to pay not only requires a survey of smallholders, but also an assessment of existing similar tools that might compete with the services offered.

8. Retaining users

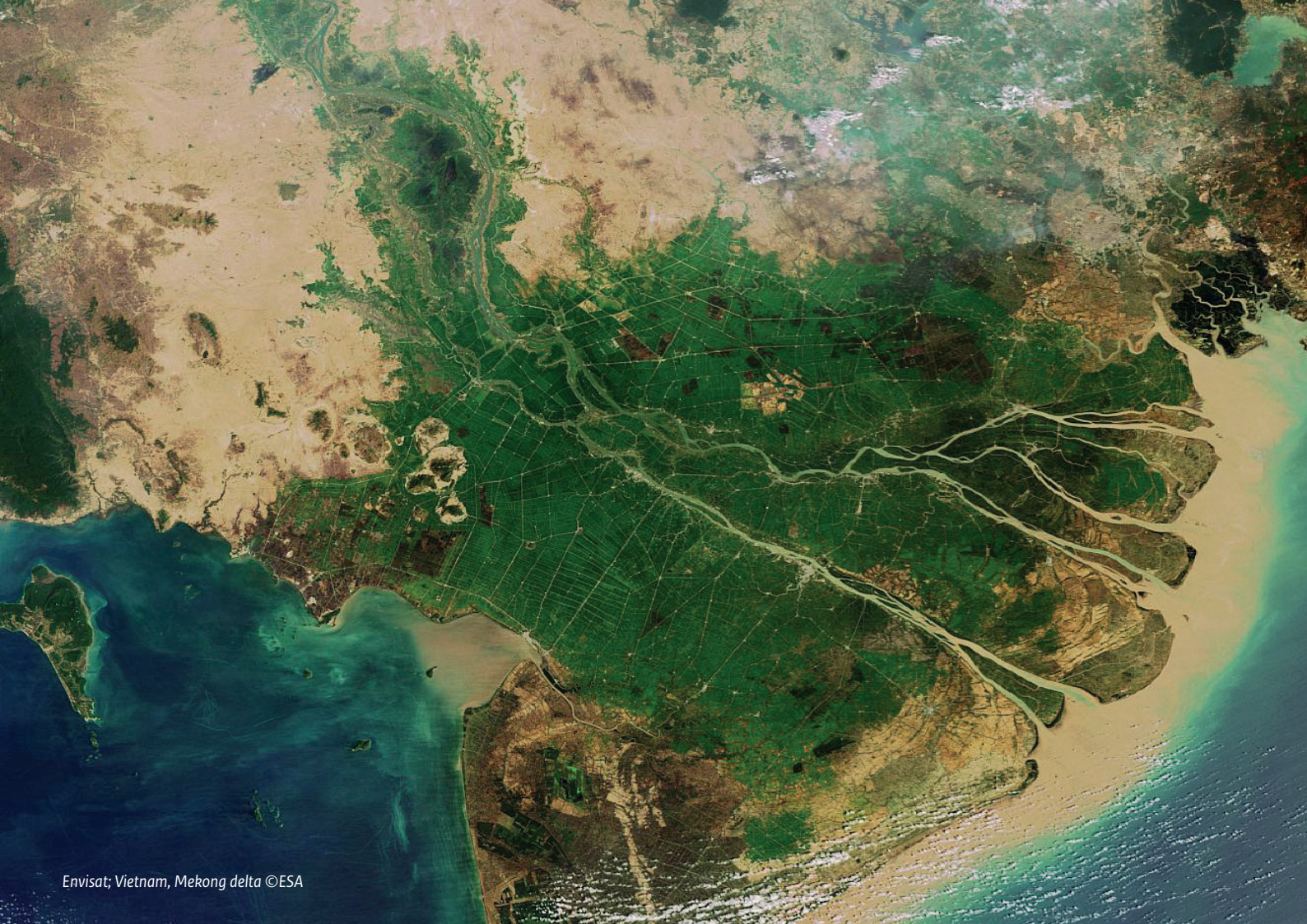
A successful and economically sustainable service benefits from a stable user base. This requires that the services provided are highly relevant throughout the year, and easy to use. In order to make them relevant throughout the year, features can be included that are also relevant outside of the growing season (e.g. market information, financial planning, health information). To reduce complexity for the user, the service should

be designed together with farmers and have sufficient offline features (as there has often been less connectivity than anticipated). In any case, frequent user satisfaction surveys are an important tool for understanding the degree to which the service is appreciated by all user segments and how it can be improved.

9. Planning for scaling of services

Scaling is often required to generate sufficient revenue. Scaling can be done by: 1) strengthening the same service in the same market (higher market penetration), 2) adding new services in the existing market (product development), 3) moving the existing services to new markets (market development), 4) or creating new products in new markets (diversification)⁷. Many of the G4AW partnerships are strongly focused on adding new products or moving to new countries. In many cases, scaling could be achieved more easily by strengthening the existing products in the country (market) where they are already active (higher market penetration).

⁷ Scaling up social businesses in developing markets - ScienceDirect



Envisat; Vietnam, Mekong delta ©ESA

10. Accessing additional capital

Many partners see access to capital as the main limitation to continuing services. The problem is that more finance will not make the service sustainable if the basics are not covered. This means partners need to focus first and foremost on service optimization, financial modelling, entrepreneurial competence building, and partnership brokering. An investor will not invest in a business if the business case is not solid and the business owner is not yet well established. Additional funding from public sources or grant programmes can help with de-risking the business case. It should be realized from the start of a project that in the long term, (private or own) financing is most likely required. Blended finance is an option that should be pursued from the start, or even as early as at the stage of writing the project proposal.

Colofon

This study was carried out in the framework of the Geodata for Agriculture and Water Programme by the Netherlands Space Office.

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The Geodata for Agriculture and Water (G4AW) programme stimulates sustainable food production, a more efficient use of water in developing countries, and aims to alleviate poverty by enhancement of sustainable economic growth and self-reliance in the G4AW partner countries. G4AW provides a platform for partnerships of private and public organisations. Together they provide food producers with relevant information, advice and financial products.

G4AW is a programme by the Dutch Ministry of Foreign Affairs within the policy priorities for food security and water, which is executed by the Netherlands Space Office (NSO).



Ministry of Foreign Affairs of the
Netherlands