EXPLORING THE NATURE OF DYNAMIC CAPABILITIES AND ENABLING ENVIRONMENTS FOR SERVICE INNOVATION IN THE GLOBAL SOUTH: THE CASE OF DIGITAL AGRO-ADVISORY SERVICES IN BURKINA FASO

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De Boeck Supérieur | « Journal of Innovation Economics & Management »

2022/3 N° 39 | pages 241 à 273

ISBN 9782807398177
DOI 10.3917/jie.pr1.0127

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Exploring the Nature of Dynamic Capabilities and Enabling Environments for Service Innovation in the Global South: The Case of Digital Agro-advisory Services in Burkina Faso[1]

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1. *Research Funding:* This work was supported by the French National Research Agency under the Investments for the Future Program, referred as ANR-16-CONV-0004. *Acknowledgements:* We would like to express our sincere thanks to the members of the organizations we interviewed for their interest in our work and their time. We also thank the two anonymous reviewers for their contributions, which helped us to significantly improve this article.

DOI: 10.3917/jie.039.0241

ABSTRACT

This study proposes to operationalize and contextualize existing frameworks of dynamic capabilities to clarify whether the untapped potential of digital agro-advisory services in the Global South can be explained by the weak dynamic capabilities of local organizations developing these services. In collaboration with two Burkinabe farmer organizations engaged in international development partnerships to digitalize their agro-advisory service, we developed a framework to assess the micro-foundations of the dynamic capabilities needed to innovate in this specific context. The assessment conducted confirms that the organization that failed to develop a service that fully met user expectations lacked specific dynamic capabilities, including the capabilities to develop and orchestrate the partnership; to design and experiment; and to scale up and sustain the new service. It also highlights that the configurations of the partnerships prevented local service providers from fully mobilizing their capabilities. We thus provide recommendations to improve the design of such partnerships.

KEYWORDS: Dynamic Capabilities, Micro-foundations, Open Service Innovation, Digital Agro-advisory Services, Farmer Organizations, Burkina Faso, International Partnerships

JEL CODES: O3, Q1

In a context of climate change, farmers in southern countries face many challenges, which require the development of innovative agro-advisory services (Faure *et al.*, 2019). Agro-advisory services aim to provide information and knowledge that will enable farmers to solve the problems they encounter on their farms and to improve their production practices (Faure *et al.*, 2012; Faure *et al.*, 2018b). Advisory service providers are increasingly mobilizing digital technologies to improve the performance of their services (Ortiz-Crespo *et al.*, 2020). Examples of digital agro-advisory services include market information services, call centers, decision-support tools on smartphones, and farmer-centered videos (Steinke *et al.*, 2020). However, despite two decades of promising experience, these organizations still struggle to produce digital advisory services that fully meet user expectations (*ibid.*). We hypothesize that this may be explained by the weakness of southern advisory service providers' capabilities, or by partnership configurations that do not allow for the valorization of service providers' capabilities.

Developing a new digital agro-advisory service is indeed an open service innovation process (Alexiev *et al.*, 2015; Chesbrough, 2003, 2010; Kernecker *et al.*, 2021), which requires a specific set of capabilities (Chesbrough *et al.*, 2018; Teece, 2020). Previous studies have identified dynamic service innovation capabilities (DSICs) as essential capabilities to successfully develop and

deploy service innovations (Agarwal, Selen, 2009; Den Hertog *et al.*, 2010; Janssen *et al.*, 2018). However, empirical studies that operationalize the concept of dynamic capabilities are still scarce (Kindström *et al.*, 2013; Laaksonen, Peltoniemi, 2018). Following Kindström *et al.* (2013) and Laaksonen and Peltoniemi (2018), we define operationalization as the identification, in each specific context, of the organizational skills, tools, and practices that constitute these capabilities, with a view to designing indicators to assess them. In this perspective, some studies have sought to identify the micro-foundations of DSICs (Janssen *et al.*, 2016; Kindström *et al.*, 2013). Micro-foundations refer to the "*distinct skills, processes, procedures, organizational structures, decision rules, and disciplines*" that constitute dynamic capabilities (Teece, 2007, p. 1319).

While the validity of the frameworks identifying DSICs' micro-foundations has been attested for private service providers in northern countries, it was never applied to the context of agricultural service innovation in southern countries. Yet agricultural innovation in the Global South presents unique challenges, mainly due to the diversity of the actors involved in these processes and the specificities of the partnership configuration (Faure *et al.*, 2018a; World Bank, 2012). Innovative initiatives are often framed by international development partnerships with large resource asymmetry between partners (Lister, 2000), and cognitive and operating differences (London *et al.*, 2006). These innovation partnerships involve many layers of stakeholders with conflicting or even contradictory expectations (Diallo, Thuillier, 2005), which makes it difficult to manage them. For Ika and Hodgson (2014), development partnerships in the Global South represent "*an extreme case of characteristics common to conventional projects, whether they are private or public sector, national or international projects. Their socio-political complexity (…) is often high and thus they would fit at the far-right end of the spectrum on a continuum from private projects, through public sector projects, to international projects*" (p. 1186). Furthermore, in the specific case of agro-advisory services, service providers in the Global South often face a number of organizational weaknesses due to decades of under-investment in their capacity development (Davis, Sulaiman, 2014). All these challenges shape a specific set of required capacities for agricultural service innovation in the Global South (Toillier *et al.*, 2020). Consequently, the DSICs identified in frameworks that are considered for service innovation in northern countries are worthy of closer study and eventual adaptation.

Previous studies also suggest that short-term international development partnerships do not constitute a favorable environment for the valorization of local organizations' capabilities (Hull, Lio, 2006; Toillier *et al.*, 2019;

Triomphe *et al.*, 2016). In contrast, partnership configurations that are long term and offer a more adaptable framework (such as innovation platforms, living labs, or incubators) are often considered more favorable to the valorization of stakeholders' capabilities in innovative activities (Baelden, Van Audenhove, 2015; Sell *et al.*, 2018). There is therefore a need to characterize how various partnership configurations influence the valorization of agro-advisory service providers' capabilities.

Figure 1 summarizes the observations and knowledge gaps driving the following two research questions:

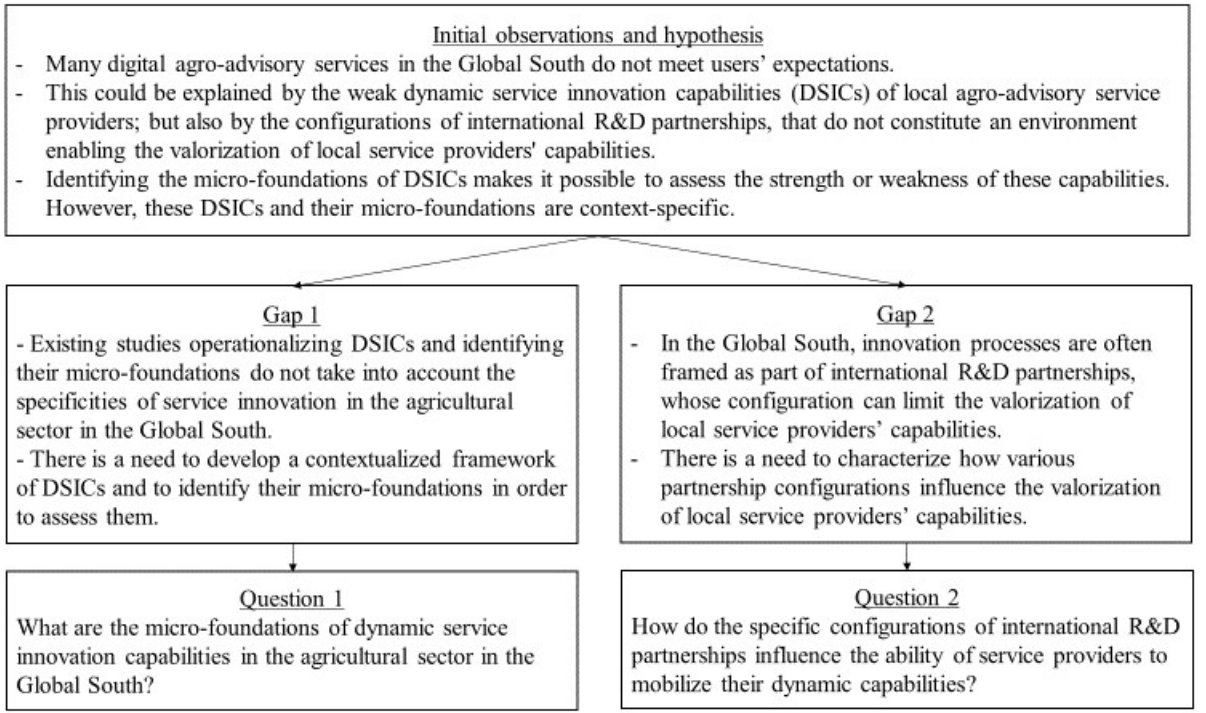
– What are the micro-foundations of dynamic service innovation capabilities in the agricultural sector in the Global South?

– How does the specific configuration of international development partnerships influence the ability of local service providers to mobilize their dynamic capabilities?

To answer these questions, we developed a contextualized framework of DSICs with two farmer organizations (FOs) in Burkina Faso, who collaborated with international NGOs to develop a new digital agro-advisory service. Only one of these FOs succeeded in developing a digital agro-advisory service that fully met user expectations. To test the validity of the contextualized framework, we used it to assess the DSICs of these two FOs. This allowed us to analyze whether the FO that produced a service that met user expectations possessed the identified DSICs, and conversely whether the FO that did not achieve this goal lacked these DSICs.

In the first section, we present the existing literature on DSICs and their operationalization, as well as previous work questioning the influence of partnership configurations on the valorization of DSICs. In the methodology section, we explain the approach used to develop the contextualized framework of DSICs, and then to assess them. In the results section, we present the contextualized framework of DSICs and specify which DSICs the two FOs were able to mobilize to innovate in their agro-advisory service. Finally, we discuss the contributions and limitations of this contextualized framework of DSICs and provide recommendations for developing international development partnerships that are more favorable to valorizing the capabilities of service providers in southern countries.

Figure 1 – Observations and knowledge gaps driving the research questions



Theoretical Background

A Need to Operationalize and Contextualize Existing Frameworks of Dynamic Service Innovation Capabilities

Dynamic capabilities, *i.e.* the capabilities to sense, seize, and transform (Teece, 2007), are crucial for developing innovations as they help to maintain or improve an organization's set of resources and abilities in changing environments (Breznik, Hisrich, 2014). Because services are intangible, heterogeneous, non-stockable, and generally co-produced with users (Lovelock, Gummesson, 2004), service innovation processes are characterized by a number of peculiarities and raise specific challenges (Gallouj, Djellal, 2010). For this reason, management researchers argue that Teece's set of dynamic capabilities, built originally for product innovation, requires adaptation (Janssen *et al.*, 2016). Based on a literature review on service innovation, Den Hertog *et al.* (2010) identified six dynamic capabilities essential to manage service innovation: signaling user needs and technological options; conceptualizing; (un-)bundling; co-producing and orchestrating; scaling and stretching; and learning and adapting. Janssen *et al.* (2016) enriched this framework by identifying a list of micro-foundations of these dynamic service innovation capabilities (DSICs) and used it to assess the DSICs of 391 service organizations in the Netherlands. From another perspective, Toillier *et al.* (2020) identified five capacities for open innovation in the agricultural sector in the Global South, *i.e.* the capacity to engage in collaborative activities, the capacity to develop and manage an innovation agenda, the capacity to experiment and deliver results in a timely manner, the capacity to expand the partnership, and the capacity to improve the partnership's environment. The authors also identified organizational skills and activities that are constitutive of these capacities. While the framework developed by Den Hertog *et al.* (2010) and Janssen *et al.* (2016) incorporates the specificities of service innovation, it does not reflect the specificities of agricultural innovation sector in the South. On the other hand, the framework developed by Toillier *et al.* (2020) does not reflect the specificities of service innovation. There is therefore a need to operationalize and contextualize existing DSIC frameworks.

Exploring the Influence of the Partnership Configuration on Local Service Providers' Ability to Mobilize Their Capabilities

Previous research on knowledge management highlight that organizations mobilize their capabilities only if their environment allows them to do so (Armstrong, Foley, 2003; Hiemstra, 1991; Jonassen, Land, 2014). In the agricultural sector in the Global South, such an environment is generally shaped by partnership agreements within short-term international development projects (Toillier *et al.*, 2019; Triomphe *et al.*, 2016). If they offer interesting opportunities for inter-organizational collaboration, these international development projects are also perceived as poorly suited to enhancing creativity and innovation (Hull, Lio, 2006; Ika, Hodgson, 2014; Triomphe *et al.*, 2016). Funders of these projects generally demand a high degree of accountability from the implementing organizations to ensure that the project objectives, often defined in advance, are met (Ika, Hodgson, 2014). This pressure to achieve objectives in a short period of time, and the lack of adaptability of the activities initially planned, can discourage the organizations involved from mobilizing their capabilities to engage in innovative activities (Hull, Lio, 2006). Moreover, in the agricultural sector, these international development projects have for a long time been led following an approach of transfer of technology or knowledge (Klerkx *et al.*, 2012). This approach, implying that technology and knowledge developed by northern organizations are then transferred to the South, has often resulted in ignoring the capabilities of southern organizations, as they were scarcely involved in the design and implementation of innovative projects (Toillier *et al.*, 2019).

In contrast, partnership configurations that are long term and offer a more adaptable framework (such as innovation platforms, living labs, or incubators) are often considered to be more favorable to the valorization of the stakeholders' capabilities in innovative activities (Baelden, Van Audenhove, 2015; Sell *et al.*, 2018). More inclusive and participatory collaboration approaches have also been implemented to lead innovation partnerships in the Global South and are also perceived as more favorable to the valorization of southern organizations' capabilities (Faure *et al.*, 2018b; TAP, 2016). Based on these insights, we propose to clarify the influence of partnership configurations on the ability of local organizations to mobilize their capabilities to innovate in services. To characterize the configuration of international development partnerships, we retain three dimensions that appear to influence the ability of local service providers to mobilize their capabilities, namely (1) the duration of partnerships; (2) the degree of adaptability of the activities planned; and (3) the collaborative approach.

Methods

To assess service providers' DSIC in the Global South, we developed a contextualized framework using a participative and abductive approach. Based on this framework, we created three data collection tools that allowed us to assess service providers' DSICs. We used them to analyze two case studies, which allowed us to test the validity of the contextualized framework initially created. In this section, we first present the case studies, then detail how the contextualized framework was developed, and finally present the methodology used to assess service providers' DSICs.

Selection and description of case studies

We chose to conduct our study in Burkina Faso, whose innovation processes have similar characteristics to those of other southern countries, as presented in the introduction. Burkina Faso is a low-income, landlocked Sahelian country (GDP/capita of $857 in 2020)[2]. In 2019, its human development index (HDI) value was 0.452 - which ranked it 182nd out of 189 countries and territories (PNUD, 2020). Its 21 million people depend primarily on subsistence agriculture (Toillier *et al.*, 2016). Funding for research and innovation activities comes largely from international organizations (public and private), which are also strongly involved in the programming and implementation of these activities (*ibid.*). Differences in resources and capacities between the local and international organizations involved often result in the creation of asymmetrical innovation partnerships (Ayimpam, Bouju, 2015). We then chose to analyze specifically the DSICs of farmer organizations (FOs), which are now key actors in agro-advisory services in southern countries (Iyabano *et al.*, 2021; Toillier *et al.*, 2015).

We identified two case studies, in each of which a Burkinabe FO developed a digital agro-advisory service in partnership with an international non-governmental organization (NGO). In both case studies, the users of the new service are the farmers belonging to the FO. These farmers expect the new digital advisory service to facilitate the production and sharing of relevant information and knowledge to improve their production and farm management practices. In the first case study (hereby the Cotton case study), the farmer organization is a long-established union of cotton producers' cooperatives. Created in 1998, it counted in 2018 more than 9,000 cooperatives, grouped at the departmental, provincial, and national levels (Coulibaly, 2018). The Cotton FO has significant own resources, mainly stemming from

2. https://donnees.banquemondiale.org/indicator/NY.GDP.PCAP.CD?locations=BF

cotton selling (a major cash crop in Burkina Faso) and its shares in cotton companies' capital. It employs around 150 employees, including 15 technicians managing the organic and fair-trade cotton production program at the FO's headquarters and 35 advisors working with organic cotton producers. The FO started developing its advisory service for organic cotton producers in 2004. This service aims to train farmers in cotton production and collects data to ensure that farmers are meeting the production specifications required for organic certification. The Cotton FO wanted to innovate its service by developing a digital platform that would provide information and knowledge to better advise farmers and facilitate the collection of the data required to obtain organic certification. The technological solution developed consists of a platform accessible on computers and digital tablets handled by the FO advisors.

In the second case study (hereby the Niebe case study), the farmer organization is a recent union of three Niebe[3] producer cooperatives gathered at the provincial level. The first cooperative was created in 2002. The Niebe FO has limited resources, mainly stemming from international development partnerships and the provision of various services to farmers, including advisory services, access to fertilizers and to storage infrastructure, and grouped commercialization. These services are managed by six technicians and three advisors who are employed by the international NGO that supports the FO as part of a long-term partnership. The FO also relies on 'pilot producers' who act as intermediaries between advisors and FO members. The Niebe FO has developed a service of management advice to family farms since 2008. This service allows advisors to collect data to assess the yield that will allow producers to feed their families and earn a satisfactory income, and to anticipate and evaluate their expenses and revenues in order to improve the management of their farms. The Niebe FO wished to innovate its service by developing a digital platform to facilitate the collection, processing, and sharing of this data. The technological solution developed consists of a platform accessible on computers and digital tablets handled by FO advisors. The data is collected using tablets, then centralized on the platform, analyzed by technicians, and retransmitted to farmers by the advisors during face-to-face advisory sessions.

We selected these case studies because of their contrasting situations with respect to (1) the ability of FOs to successfully innovate their service and (2) the configuration of their partnerships with international NGOs. The Niebe FO is the only one that has developed a digital advisory service that fully met user expectations. Literature reviews (Heeks, 2002; Steinke *et al.*, 2020)

3. Niebe is more commonly known as black-eyed pea.

and recent case studies (Kieti *et al.*, 2022; Ortiz-Crespo *et al.*, 2020; Wyche, Steinfield, 2016) exploring the factors limiting the performance of digital agro-advisory services in the Global South show that these services can only be sustained and scaled up if they meet user expectations. Producing a new service that meets the expectations of users is therefore a necessary condition for service innovation to be considered successful. In this sense, the Niebe case study represents a successful service innovation process, and the Cotton case study an incomplete service innovation process.

The two case studies also differ by the configuration of their partnerships with NGOs (see Table 1). In the Cotton case study, the new service was developed and funded as part of a short-term development project (2015-2019). The project funders expected a high level of accountability. The project's objectives and the activities to be implemented and the allocation of resources were planned in advance and not easily adaptable as they were specified in a binding agreement. The NGO managing this project planned to develop and then transfer the digital platform to the Cotton FO, along with the skills required to ensure its management. The partners' collaborative approach therefore resembles that of transfer of technologies and knowledge. In the Niebe case study, the new service was developed as part of a partnership with no scheduled end date. Since the project was funded by the remaining resources of a previous project, the accountability requirements were quite limited. The FO and the NGO formalized their partnership through a non-binding and flexible partnership agreement. The objectives and activities to be conducted were assessed and adapted in consultation with FO members each year. The collaborative approach in the Niebe case study can thus be considered as inclusive.

Table 1 **– Comparative characteristics of the two case studies**

		Cotton case study	***Niebe case study***
Configuration of the partnership	**Duration**	Four-year partnership	No scheduled end date
	Degree of adaptability of objectives and activities	Limited (high level of accountability demanded by the donors)	Strong (low level of accountability demanded by the donors)
	Collaborative approach	Transfer of technology and knowledge	Inclusive

An Abductive Approach to Develop A Contextualized Framework of Dynamic Capabilities for Service in the Global South

To design a conceptual framework for DSICs tailored to the context and sector studied, we used an abductive and participative approach. After identifying the existing literature on DSICs and on capacities to innovate in the agricultural sector in the Global South, we collaborated with the two selected FOs to explore the validity of these frameworks in their specific situation. To do so, we identified the FO and NGO members involved in the development and management of the new digital service. These included elected representatives of the FO, FO technicians working at their headquarters, FO advisors, and NGO technicians (totaling 47 individuals in the Cotton case study and 10 in the Niebe case study) (see Table 2).

During a workshop conducted in each FO in June 2019, we presented to these individuals existing frameworks of DSICs (Den Hertog *et al.*, 2010; Janssen *et al.*, 2016) and of capacities to innovate in the agricultural sector in the South (Toillier *et al.*, 2020). Workshop participants were divided into two groups (technicians and elected representatives of the FO on one side; advisors on the other). Each group first analyzed the relevance for its specific context of the presented frameworks. Then, they reflected on the hierarchy between the capabilities identified in order to differentiate them from sub-capabilities. Each group was asked to identify for each DSIC identified two or three key sub-capabilities, as well as five micro-foundations of each sub-capability.

After this workshop, we compared the propositions made by each group and grouped them when they referred to common themes. We combined these proposals the capabilities and sub-capabilities (SC) referring to these themes. Finally, we compiled the list of micro-foundations of each group so that the proposals from all four groups, even the least common, were included in the final list of micro-foundations. This list of micro-foundations, numbered for each sub-capability from I1 (indicator 1) to I5 (indicator 5), was later validated by FO technicians and elected representatives. We present this contextualized framework in the first part of the Results section.

Data Collection and Analysis Process to Assess DSICs

We used three tools to assess FOs' DSICs, *i.e.* closed questionnaires, semi-direct interviews, and a collective workshop in each FO. Table 2 presents the nature of participants and the participation rate for each data collection tool.

The closed questionnaire was built from the list of micro-foundations presented in Table 4 and addressed to the individuals involved in developing the digital agro-advisory service. For each indicator, respondents were asked whether the FO had mobilized this micro-foundation to develop the new service (answer 'Present') or not (answer 'Absent'). This assessment of the micro-foundations present or absent allowed us to assess the level of each sub-capability, then each DSIC. We considered an SC to be strong when the FO possessed four to five micro-foundations out of the five identified for that SC; intermediate when it had two to three; and weak when it had one or none. We then determined the level of DSICs from the strength of their constitutive SCs: if a majority of the SCs constituting the DSIC were weak, then the DSIC in question was assessed to be weak. If the three SCs constituting the DSIC were respectively weak, intermediate, and strong, then the DSIC was considered as intermediate.

Table 2 – **Participation rates in questionnaires, interviews and workshops**[4]

	Profile of individuals	Individuals involved in service development	Participation rates of:		
			Question-naires	Interviews	Workshop
Cotton case study	FO representatives	3	67%	100%	100%
	FO technicians	10	60%	100%	100%
	FO advisors	32	100%	31%	13%
	NGO technicians	2	0%	50%	50%
	Total	**47**	**85%**	**51%**	**38%**
Niebe case study	FO representatives	3	100%	100%	0%
	NGO advisors	5	80%	100%	100%
	NGO technicians	2	100%	100%	100%
	Total	**10**	**90%**	**100%**	**70%**

We then conducted qualitative semi-direct interviews (see Table 3 for the interview guide categories) in order to collect additional data on the partnership's configuration, the FO's involvement in the service development, the micro-foundation it did or did not mobilize, and the effects of partnerships' configuration. These interviews also helped to clarify the nature of service

4. The participation of Niebe FO advisors in the workshop was low (13%) because some advisors, scattered throughout Burkina Faso, were unable to travel. However, they provided written feedback on the preliminary results of the questionnaires and interviews. Similarly, elected representatives of the Niebe FO could not attend the workshop due to security problems in Burkina Faso that limited their travel capacity, but provided their feedback after the workshop during a phone meeting.

users' expectations and whether these expectations were met (see category 5 of the interview grid in Table 3 below).

Table 3 – Semi-direct interview categories

1- Interviewee profile
2- Description of the partnership's configuration and the relationship with partners
3- Interviewee's involvement in the development and management of the new service
4- Successes and difficulties encountered during the service innovation process
5- Opinion about the new digital agro-advisory service (relevance for users and sustainability)

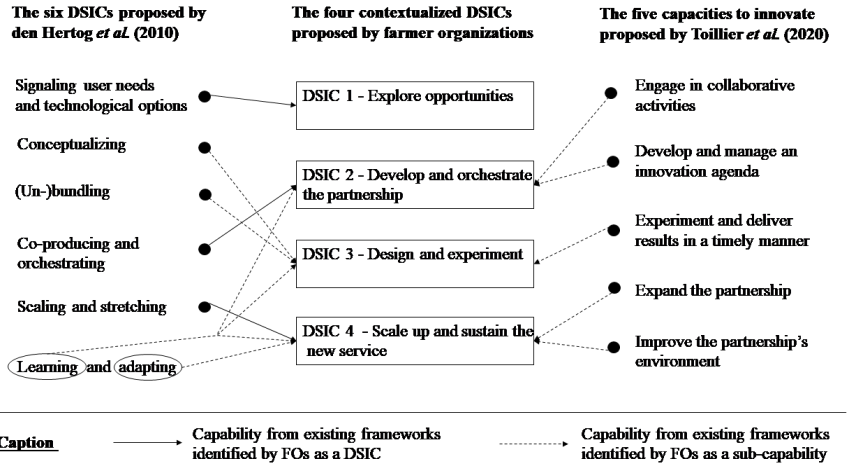
We used topic and analytical coding techniques to analyze this qualitative data (Richards, 2015), using the indicators presented in Table 4 to produce these codes. On this basis, we produced individual stories describing in more detail how the partnership unfolded and how the FO participated in the development of the new service. To verify the accuracy of these assessments, we collected and analyzed secondary data, such as meeting minutes or activity reports written during the partnership. A collective workshop was finally held in each FO in December 2019 to produce a consensual assessment of DSICs. During the workshop, we first presented the preliminary results of the individual questionnaires and semi-direct interviews. When individual assessments of the DSICs' micro-foundations differed, interviewees shared and discussed their opinions to reach a consensus. They also identified factors that prevented full mobilization of these DSICs.

Results

The operationalized framework of dynamic service innovation capabilities

We first present the operationalized framework of dynamic service innovation capabilities (DSICs). Figure 2 below shows how the FOs mobilized the frameworks of Den Hertog *et al.* (2010) and Toillier *et al.* (2020) to identify four core DSICs: the capability to explore opportunities (DSIC 1); the capability to develop and orchestrate the partnership (DSIC 2); the capability to design and experiment (DSIC 3); and the capability to scale up and sustain the new service (DSIC 4).

Figure 2 – The contextualized DSICs identified by FOs based on existing frameworks



They then identified sub-capabilities and micro-foundations, that are presented in Table 4.

The sub-capabilities and micro-foundations mentioned in the work of Den Hertog *et al.* (2010) and Janssen *et al.* (2016) appear in white in Table 4 ; those mentioned in the work of Toillier *et al.* (2020) are highlighted in light gray; and those that the FOs added are highlighted in dark gray. The sub-capabilities and micro-foundations highlighted in light and dark gray thus capture the specificities of service innovation in the agricultural sector in Global South.

The first core DSIC, 'Explore opportunities', refers to the sub-capability to determine user needs (SC 1.1) and technological options (SC 1.2).

The second core DSIC, 'Develop networks and orchestrate the partnership' is composed of three sub-capabilities, mostly drawn from Toillier *et al.* (2020). SC 2.1 ('Create a partnership and influence joint activities') allows to assess whether FOs were able to be heard during negotiations, despite their more limited financial and human resources. The FOs added the SC 2.2 ('Self-advocate and overcome conflict') as they found it crucial to be able to prevent and manage potential conflicts, and to develop mechanisms for value protection and ownership to ensure that they benefit from the service innovation. Similarly, they included the SC 2.3 ('Share information and knowledge') as they considered it particularly important (but challenging) to be able to exchange information with their partners, despite the geographical, cultural, or cognitive distance within the partnership (as reflected by I1, I2, I3). They also added two additional indicators (I4 and I5) to assess whether

Table 4 – Contextualized dynamic service innovation capabilities, sub-capabilities, and assessment indicators

Core capabilities	Sub-capabilities (SC)	Definition of capability sub-domains	Micro-foundations of DSIC used as assessment indicators
DSIC 1 – Explore opportunities	***SC 1.1 – Foresee and determine users' needs***	Capability to identify shortcomings in the service offer and to identify user expectations in order to improve the service	I1- Weaknesses and strengths of the agro-advisory service are identified
			I2- Comparisons are made with other agro-advisory services
			I3- Digital solutions put into practice in the FO are known
			I4- FO technicians and representatives are aware of users' skills and activities
			I5- FO technicians and representatives are aware of users' expectations regarding the agro-advisory services
	SC 1.2 – Foresee and determine technological opportunities and risks	Capability to look for information about technological opportunities for agricultural services, to assess risks, and to share information internally	I1- Solutions are sought to improve the current agro-advisory service
			I2- The FO is part of networks concerning digital agro-advisory services
			I3- Digital solutions used for agro-advisory services (especially in FOs) are known
			I4- Limits and risks of these solutions are known
			I5- Limits and risks of these solutions are internally discussed
DSIC 2 – Develop and orchestrate the partnership	***SC 2.1 – Create a partnership and influence joint activities***	Capability to choose the right partners, to be proactive in the partnership's development and to formalize it by clarifying mutual commitments, shared tasks, and responsibilities	I1- Possible partners are actively sought
			I2- Partners are informed about the FO's vision and activities
			I3- Documents stating mutual commitments, shared tasks, and responsibilities are drafted
			I4- Joint meetings are held to negotiate the innovation project's objectives and contents
			I5- The FO's advice and wishes are taken into account when defining the project
	SC 2.2 – Self-advocate and overcome conflict	Capability to defend organizational interests, minimize collaboration risks, anticipate conflicts and, if necessary, overcome them	I1- The NGO is aware of the FO's expectations and needs
			I2- The FO can advocate for its choices in case of conflicting views with its partner
			I3- The FO and its partner have developed tools to manage conflicts
			I4- The FO anticipates issues concerning protection and value appropriation
			I5- Suitable protection and value appropriation mechanisms have been created
	SC 2.3 – Share information and knowledge	Capability to exchange information internally and with partners, despite geographical, cultural, and cognitive distances	I1- The FO and its partners discuss the information needed to digitalize the advisory service (orally or in a written format)
			I2- The FO and its partners understand each other's points and needs
			I3- Documentation about the digital advisory service is drafted and validated by the partners
			I4- The FO's staff share relevant information to develop the new service to the FO members in charge
			I5- The FO's staff have opportunities to react and share their points of view with the partner

DSIC 3 – Design and experiment	***SC 3.1 – Ensure the strategic viability of the innovation project***	Capability to define an innovation project in line with the organization's strategy and resources and to adapt organizational structures and practices to better support the innovation project	I1- The vision, strategies, and resources of the FO are well known internally
			I2- Documents about the FO's innovation strategy and allocation of resources are drafted
			I3- Meetings with the partners are held regularly on resource allocation and strategizing
			I4- Internal managerial changes are made to facilitate the commitment of the staff to the project
			I5- The project activities take into account the FO's resources and innovation strategy
	SC 3.2 – Involve users	Capability to involve users in the design and development of the service innovation	I1- Users are selected to contribute to the design of the digital advisory service
			I2- Users have opportunities to express their expectations regarding the digital solution's functionality and ergonomics to FO members
			I3- Expectations of users are shared with the partner and the developer
			I4- Users have opportunities to follow up during development of the digital solution and service
			I5- Users effectively contribute to the design and development of the digital solution and service
	SC 3.3 – Conceive and adapt service prototypes	Capability to conceive service prototypes, test and improve them to obtain satisfactory results	I1- The FO interacts with the developer and shares its expectations for the new digital solution and service
			I2- Several digital solutions are presented, with lists of the resources and skills required for their adequate functioning
			I3- A digital solution is chosen on the basis of a holistic assessment of its impacts on the service
			I4- The chosen digital solution is tested and several iterations of adaptation are undertaken
			I5- The final service prototypes meet user expectations
DSIC 4 – Scale up and sustain the new service	***SC 4.1 – Learn from the partnership***	Capability to identify collaboration shortcomings and generate new learning, share this within the organization, and leverage this for future innovation projects	I1- Formal tools and/or procedures to share knowledge internally exist
			I2- The FO's staff is asked to reflect on the difficulties met and what was learnt during the partnership
			I3- Difficulties met and new learning resulting from the partnerships are identified
			I4- Difficulties met and new learning resulting from the partnerships are shared within the FO
			I5- Training is implemented to leverage new knowledge and conceive strategies to overcome prior difficulties
	SC 4.2 – Adapt the internal organization	Capability to adapt internal structures and to reallocate resources and capabilities	I1- Formal tools and/or procedures to monitor and evaluate the new digital service exist
			I2- The resources and skills needed to ensure the functioning of the new service are discussed and a strategy is implemented
			I3- New resources to ensure the functioning of the new service are found
			I4- Internal functions are adapted to ensure the operation of the new agro-advisory service
			I5- FO members develop the skills to use the new digital platform
	SC 4.3 – Communicate and relate to the new partners	Capability to share the achievements of this service innovation process with new potential partners and with other service providers to scale up the service innovation	I1- Resources are allocated to capitalize the experience gained and conduct advocacy activities
			I2- Capitalization documents about the new digital agro-advisory services are drafted
			I3- Key actors in the digital sector are identified
			I4- Project results are shared with potential partners
			I5- Project results are shared with other FOs

the FOs are able to share relevant information internally despite the fact that the FO may cover a large territory.

The third core DSIC, 'Design and experiment', is also composed of three sub-capabilities. The FOs added the SC 3.1 ('Ensure the strategic viability of the innovation project') as they considered it essential to be able to define an innovation project in line with their strategy and limited resources; and to allocate those limited resources for the innovation project without impacting the functioning of their other activities and services (see I1, I2, I3 and I5). They also considered it crucial to be able to modify the job assignments of their staff, so that they can be involved in the innovation project, but without impeding the proper conduct of ordinary activities (see I4). SC 3.2 ('Involve users') and SC 3.3 (SC 3.3 – 'Conceive and adapt service prototypes') were added to reflect the specificities of service innovation.

Finally, the fourth core DSIC, 'Scale up and sustain the new service', is also composed of three sub-capabilities. The FOs added the SC 4.1 ('Learn from the partnership') as organizations developing innovative services must repeatedly be able to identify the knowledge gained during the innovation process in order to mobilize it in subsequent projects. They added the SC 4.2 ('Adapt the internal organization') as FOs found it essential to be able to assess and collect the resources needed to operate the new service on their own (as assessed by I2, I2 and I3); and to adapt their internal structure and functioning for example to cope with the departure of a partner (as assessed by I4 and I5). Finally, they included the SC 4.3 ('Communicate and relate to the new partners'): as they often operate in short-term partnerships, FOs found it essential to be able to communicate the results of previous partnerships to convince potential partners and donors to work with them to expand the service, ensure its sustainability, and develop new services.

Assessment of Farmer Organizations' Dynamic Service Innovation Capabilities and of the Influence of Partnership Configuration

We now present the results of the assessment of FO's DSICs and characterize how the configuration of their respective partnership influenced their ability to mobilize each DSIC (see Figure 3 for a visual summary).

DSIC 1 – Capability to explore opportunities

FOs' capability to explore opportunities (DSIC 1) was strong in both case studies. Their in-depth knowledge of the farmers' and advisors' profiles and activities helped them in analyzing user expectations regarding the new

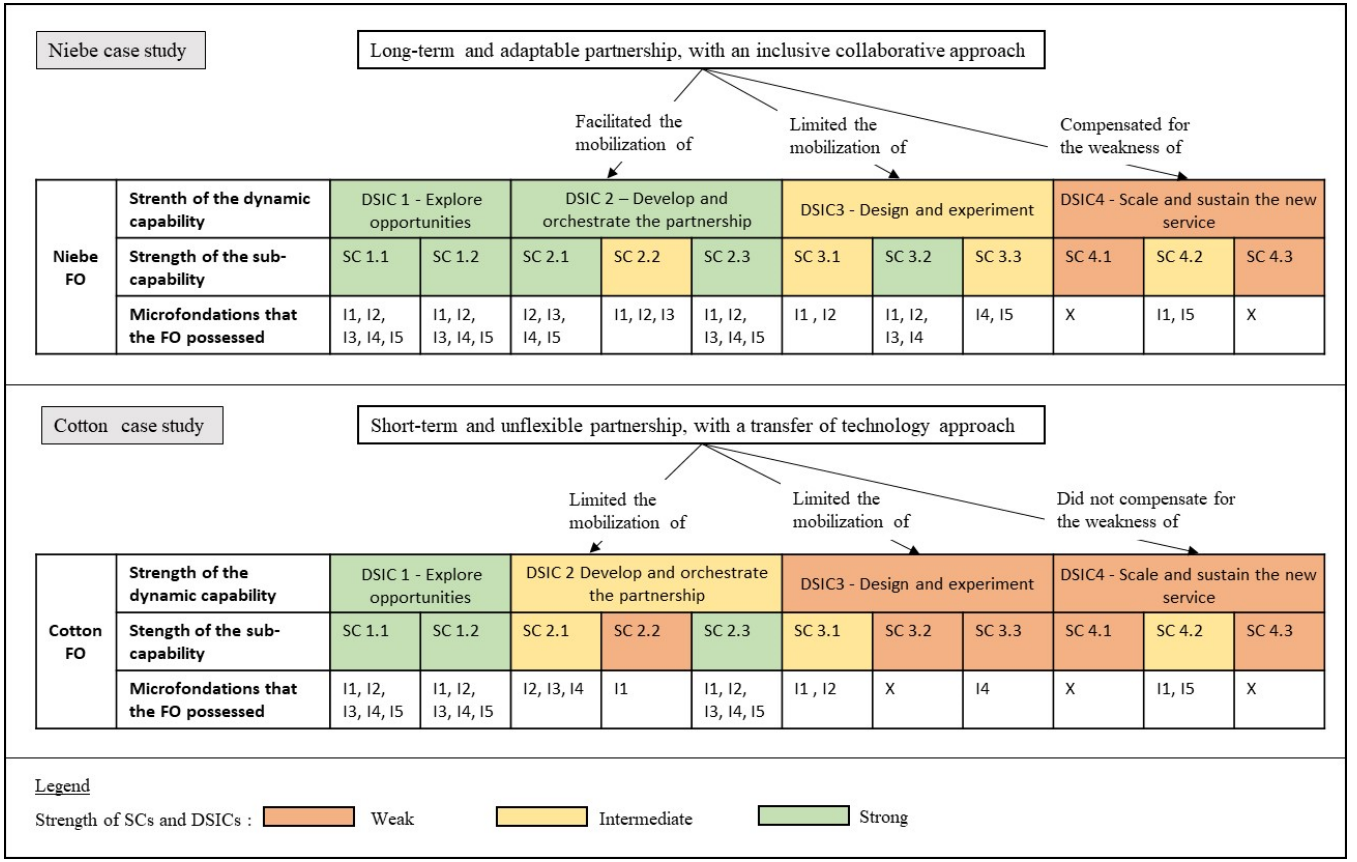
advisory service (SC 1.1). Both FOs were also able to identify technological opportunities (SC 1.2). However, the Cotton FO explained that this capability could be strengthened by developing specific tools to monitor such technological opportunities, as existing initiatives in the FO were isolated and unsystematic.

DSIC 2 – Capability to develop and orchestrate the partnership

FOs' capability to develop and orchestrate the partnership (DSIC 2) was strong in the Niebe case study, and intermediate in the Cotton case study, FOs' sub-capability to create a partnership and influence joint activities (SC 2.1) was assessed to be strong in the Niebe case study, and intermediate in the Cotton case study. In both case studies, the FOs lacked proactivity in initiating the partnership (I1 missing). They were approached by international NGOs, who also looked for financial resources to develop the new service. However, the FOs were able to inform their partners about their visions and activities, held joint meetings to negotiate the activities to be conducted during the partnership, and participated in the creation of documents specifying mutual commitments and shared responsibilities (I2, 3, 4 present). Despite this, the Cotton FO encountered difficulties to be fully heard in this negotiation process (I5 missing), as we detail below.

FOs' sub-capability to self-advocate and manage potential conflicts (SC 2.2) was assessed to be intermediate in the Niebe case study and weak in the Cotton case study. In both case studies, the NGOs were aware of the FO's expectations and needs (I1 present). Yet the Cotton FO had difficulties to advocate for its choices regarding the nature of the digital solution to be developed. It did not manage to find common ground in this regard (I2 and I3 missing). This was in part explained by the nature of the partnership configuration: the binding and inflexible partnership arrangements did not allow the Cotton FO and the NGO to re-assess their objectives to better meet the FO's wishes regarding the new digital service. As a result, the Cotton FO considered itself to be the project's "*executor*" while the NGO was seen as the "*commissioner*" (opinion expressed by a Cotton FO technician). On the contrary, in the Niebe case study, the flexible partnership arrangements enabled the FO and its partner to revise their commitments each year to better align with the FO's changing interests. The inclusive collaborative approach limited the emergence of conflicts as the NGO aimed to support the FO, while avoiding making decisions in its stead (I2 and I3 present). An advisor from the Niebe FO explained: "*Everything we do stems from the producers' demands, relayed by their elected representatives. Our goal as partner*

Figure 3 – Summary of the assessment of the Niebe and Cotton FOs' capabilities



Niebe FO	**Strenth of the dynamic capability**	DSIC 1 - Explore opportunities		DSIC 2 – Develop and orchestrate the partnership			DSIC3 - Design and experiment			DSIC4 - Scale and sustain the new service	
	Strength of the sub-capability	SC 1.1	SC 1.2	SC 2.1	SC 2.2	SC 2.3	SC 3.1	SC 3.2	SC 3.3	SC 4.1	SC 4.2	SC 4.3
	Microfondations that the FO possessed	I1, I2, I3, I4, I5	I1, I2, I3, I4, I5	I2, I3, I4, I5	I1, I2, I3	I1, I2, I3, I4, I5	I1 , I2	I1, I2, I3, I4	I4, I5	X	I1, I5	X

Cotton FO	**Strength of the dynamic capability**	DSIC 1 - Explore opportunities		DSIC 2 Develop and orchestrate the partnership			DSIC3 - Design and experiment			DSIC4 - Scale and sustain the new service	
	Stength of the sub-capability	SC 1.1	SC 1.2	SC 2.1	SC 2.2	SC 2.3	SC 3.1	SC 3.2	SC 3.3	SC 4.1	SC 4.2	SC 4.3
	Microfondations that the FO possessed	I1, I2, I3, I4, I5	I1, I2, I3, I4, I5	I2, I3, I4	I1	I1, I2, I3, I4, I5	I1 , I2	X	I4	X	I1, I5	X

is to facilitate the reflection process, by helping them look for more information or clarify it. If there are things that the NGO cannot do, that's how it is, but it's not a conflict, nor a disagreement". None of the FOs implemented property or exploitation rights over the digital platform and data produced (I4 and I5 missing). In the Niebe case study, the digital platform and the data belonged to the NGO but the FO did not consider it to be a problem as it had complete trust in its partner. On the contrary, disagreements emerged when the Cotton FO expressed a right to access and use the data collected with the new digital platform. As the FO had not implemented property or exploitation rights, the NGO refused.

Finally, both FOs had a strong sub-capability to share information and knowledge (SC 2.3). They set up organizational arrangements to overcome the geographical distances and language differences, and to ensure efficient communication with the NGOs (I1, I2, I3 present). In the Cotton case study, the NGO provided the FO with two of its technicians, who worked at the FO's headquarters. This geographical proximity facilitated their daily exchanges. In the Niebe case study, advisors were employed by the NGO but based at the Niebe cooperatives. They acted as intermediaries between the NGO and the FO. The two FOs were also able to share internally the information needed to develop the new service (I4 and I5 present).

DSIC 3 – Capability to design and experiment

The FOs' capability to design and experiment (DSIC 3) was intermediate in the Niebe case study, and weak in the Cotton case study. In both case studies, the configuration of innovation partnerships limited their ability to mobilize this DSIC.

The FOs' sub-capability to ensure the strategic viability of the innovation project (SC 3.1) was assessed to be intermediate in both case studies. Even though each FO had a clear vision of its strategy regarding its advisory services and regularly assessed its own financial and human resources (I1 and I2) present), it did not discuss it with the NGOs (I3 missing). The development of the new service was mainly managed by the NGO staff, so the FOs were not required to adapt the workload of their members. Similarly, the costs of developing the new service were mainly covered by the funds provided by the NGOs, which did not strain the FOs' budgets. However, the FOs and the NGOs did not look ahead to determine how the FOs would fund the digital service and ensure its functioning on their own after their partnership ended (I5 missing).

While the Niebe FO's capability to involve users (SC 3.2) was strong, that of the Cotton FO was weak. The Niebe FO participated indeed actively in

the design of the new digital service (I1, 2, 3 and 4 present). It decided with the FO what the digital solution would be used for and which data to collect. FO members also helped to design the digital questionnaires used to collect data: "*We designed the questionnaires with pilot producers from the FO. Since there was a lot of translation to be done, we worked with producers who spoke and wrote Moore*" (Niebe FO technician). However, the NGO chose without the FO, the organization that developed the platform, and the hardware and software that were used (I5 missing). The NGO felt that involving the FO in such innovative activities would disrupt the latter's everyday routine and threaten its ability to provide its other services. The FO was thus deprived of the possibility to mobilize its SC 3.2 to develop the digital platform, after the early stages of design.

In the Cotton case study, users were not involved in the design of the digital platform and its subsequent development (I1 to I5 missing). The Cotton FO participated only indirectly in the development of the digital platform by providing the NGO with the paper forms previously used to collect data and obtain organic certification. The NGO took care of adapting and digitalizing these questionnaires. It also chose which hardware and software to use, and how to design the ergonomics of the digital platform: "*At first, we were not consulted. We faced a* fait accompli*: there was the platform that we had to use*" (Cotton FO technician). The NGO's staff chose to manage these tasks on its own, since it feared that the weak technical capabilities of the Cotton FO would delay the achievement of the project objectives. The high level of accountability required by donors in this partnership configuration thus encouraged a risk-averse attitude on the part of the NGO. While the Cotton FO had a fine knowledge of user expectations for the new service, the configuration of the partnership thus limited its ability to mobilize this knowledge during the design and development of the digital platform.

The Niebe FO's sub-capability to conceive and adapt service prototypes (SC 3.3) was intermediate, while it was weak in the Cotton FO. None of the FOs interacted directly with the developer to express their expectations regarding the new digital service (I1 missing); the latter did not present several digital solutions that could have met these expectations (I2 missing). The NGOs were indeed in charge of the discussions with the developer. They chose to use a "*turn-key solution*" offered by the developer, rather than comparing the advantages and drawbacks of several digital solutions. The NGO in the Niebe case study felt their needs would be easily met by using simple solutions that already existed: "*In the technical and financial proposal, [the developer] presented the software they usually used to design digital platforms. It was what we were looking for*" (Niebe FO technician). Moreover, the FOs

and their partners did not discuss how integrating the chosen digital solution would affect the advisory service as a whole, including advisors' activities and their relationship with farmers (I3 missing). Yet in both case studies, the digital platforms that were finally designed were tested by a small number of users (*i.e.* advisors) visiting a few cooperatives, and then improved and made accessible for all advisors, thus reaching all cooperatives (I4 present). However, while FO technicians were consulted to fix minor bugs or develop new functions of the digital platform, some explained that their proposals to improve the platform were not implemented: "*All our difficulties were sent up to the head office, but now everything has to be done by the technical team*" (Cotton FO technician). In the end, the Niebe FO found that the prototypes of the digital platform met the expectations of users (I5 present), whereas only some of the members of the Cotton FO felt the same about their platform (I5 missing). Indeed, several Cotton FO technicians wished to extend its functions to strengthen interactions with farmers as part of the agro-advisory service, rather than use the digital platform only to check whether the farmers respected the requirements for organic certification: "*Currently, our digital solution resembles surveys, the information collected is not fed back to the producers. The limitation of this scheme is that it is not participatory: we are simply creating a database for FO technicians and our partner. What is missing is individualized feedback to the producers so that they improve their production and management practices*" (Cotton FO technician). According to FO Niebe members, their ability to produce a digital service that met user expectations was due to their strong involvement in the design of the digital platform and the inclusive collaborative approach, two elements that were missing in the Cotton case study.

DSIC 4 – Capability to scale up and sustain the new service

Finally, both FOs had a weak capability to scale up and sustain the new service (DSIC 4). However, in the Niebe case study, the partnership configuration compensated for this weak DSIC, while it triggered more difficulties in the Cotton case study.

Both FOs had a weak sub-capability to learn from partnership (SC 4.1). Neither FO had tools or processes to assess, share, and exploit new knowledge produced during its partnership with the NGO (I1 to 5 missing). Despite this lack of formalized procedures or tools, the FOs still developed new skills and knowledge during the partnership. Among others, the Cotton FO strengthened its technical skills and gained a greater understanding, not only of digital opportunities, but also of associated risks. A technician explained: "*Our system is not secure because data are stored on the cloud and not on a server that*

only we can access and control. There are a lot of power outages here, and we need to create a safer solution without using the cloud" (Cotton FO technician). The FO even began to share its experience with other value chain actors: "*Everybody is going digital. The local cotton processing company approached us to see if they should move towards that as well, because it's much more efficient. With the digital platform for organic cotton, we are really ahead of the game*" (Cotton FO technician). In the Niebe case study, the FO gained a better understanding of the opportunities digital technologies offer for advisory services, which the FO's members planned to exploit in a future project with the NGO.

The FOs' capability to adapt their internal organization to sustain the new digital service (SC 4.2) was intermediate in both case studies. The Cotton NGO possessed tools and procedures to monitor and evaluate the new digital service (I1 present), yet it did not anticipate the internal changes needed to ensure its adequate functioning after the departure of the NGO (I2 to I4 missing). The NGO planned to transfer the digital platform to the FO at the end of the four-year development project, and trained FO's technicians in this view (I5 present). However, this training occurred too late in the partnership, and the FO's technicians did not have time to get to grips with the digital platform. This belated training delayed the FO's everyday operations, as explained the department in charge of the digital platform: "*All the technicians have been trained to use the new digital platform but they are still not used to use it. So, they ask us to complete their own tasks, which keeps us from moving forward on our own day-to-day tasks*" (Cotton FO technician). As the Cotton FO technicians were so focused on solving the urgent problems encountered with the new digital service, they had no time to think about its future after the end of the partnership. Indeed, three months after the partnership ended, the Cotton FO had still not started looking for new partners. According to the FO's accounting department, this was a problem as the FO did not have sufficient resources to maintain the digital platform, nor to cover the other costs incurred by the digital agro-advisory service and the certification process (*e.g.* GMO testing in laboratories). In the Niebe case study, the configuration of the partnership made it unnecessary for the FO to adapt its internal organization to sustain the partnership (SC 4.2). The partnership had no official end date, so the members of the FO did not need to look for new resources and partners, nor to adapt the functions of its members (I2, I3, I5 missing), as the Cotton FO needed to do. However, Niebe FO members were aware that they still depended on the NGO to fund the maintenance delivery of the new digital platform.

Finally, the FOs' capability to communicate and relate to new partners (SC 4.3) was weak. Neither of the FOs' dedicated human and financial resources to capitalize and share the experience in digital advisory services that it gained during the partnership (I1 to 5 missing).

Discussion

Validation of the Identified Dynamic Service Innovation Capabilities and Insight into The Influence of Partnership Configurations

This research contributes to the operationalization of dynamic service innovation capabilities (DSICs) in the specific context of agricultural service innovation in the Global South. We confronted existing conceptual frameworks of DSICs with the reality of two farmer organizations engaged in the digitalization of their advisory services, an open service innovation process. With these FOs, we produced a contextualized conceptual framework of DSICs and their micro-foundations that allowed us to assess the strength of each DSIC. The case studies conducted in each FO then allowed us to further test the validity of this contextualized DSICs' framework. The Niebe case study does indeed illustrate which DSICs are essential to develop service innovations that meet user expectations. Conversely, the Cotton case study exemplifies the difficulties encountered by service providers when their DSICs are weak and allows us to understand how this resulted in the creation of a new service that failed to fully meet user expectations. In addition, these case studies provide insight into how two partnership configurations (a long-term, adaptable partnership with an inclusive collaborative approach vs. a short-term, low-adaptability partnership with a technology and knowledge transfer approach) influence the ability of service providers to mobilize their DSICs.

The Niebe case study shows that DSIC 1 ('Explore opportunities') is necessary to identify user expectations and produce service innovations that meet these expectations. However, the Cotton case study indicates that having a strong capability to explore opportunities does not systematically lead to service innovation that meets user expectations. It also requires that advisory service providers be actively involved in the design and development of new services. Yet in the Cotton case study, the partnership configuration prevented the FO from valorizing its in-depth knowledge of users during the design and development of the new service. The need to involve local advisory providers more actively in open innovation processes was also

highlighted by McCampbell *et al.* (2021), who studied the development of a digital advisory platform in Rwanda, which was operated by advisors from a farmer organization. Even if the partners involved in the service development wished to adopt a human-centered design approach, their study reveals that FO members were not able to influence the most impactful design decisions. These decisions were made by more powerful organizations, including an international research center and a local information and technology company.

The DSIC 2, 'Develop and orchestrate the partnership', appeared essential for service providers as it conditioned the quality of their interactions with their partners, and their inclusion in the decision-making process. A longer and more flexible partnership and an inclusive collaborative approach (as in the Niebe case) appeared to be more conducive to inter-organizational collaboration and conflict prevention. We thus concur with the conclusions of Hull and Lio (2006), who note that the complex accountability system in which NGOs are caught up is a barrier to innovation because of the risk-averse attitudes it engenders. Nevertheless, both case studies showed that the advisory service providers were not able to put in place mechanisms to appropriate the value created (in this case, the digital platform developed and the data generated). In their case study in Rwanda, McCampbell *et al.* (2021) make a similar point. They demonstrate that the farmer organization developing the digital platform was in a weak position to defend its data rights, including transparent governance; ownership, control, and access to data; and informed consent. Indeed, FO members were only involved as participants rather than decision-makers in the service innovation process. To strengthen the capability of local service providers to access, control, and own the data produced, the authors suggest that clear guidelines or regulations should be created (*ibid.*), as they currently remain very fragmented in Africa (Ayamga *et al.*, 2021).

Our study also shows that DSIC 3 'Design and Experiment' is important for successful service innovation, but that some phases of this process can be outsourced. The Niebe case study indicates that it is essential to involve service users in the early design phases of the new service, but that its subsequent development can be managed by other partners.

Finally, the Cotton case illustrates in detail the problems generated by a weak capability to 'Scale up and sustain the new service' (DSIC 4), especially in the context of a short-term partnership. The lack of anticipation of the changes to be made at the end of the partnership destabilized the organization and created delays in its management of the innovative project, but also of its routine activities. In addition, the lack of valorization of the learning

generated during the project and their low investment in communication limited their ability to find new partners to ensure the sustainability of the new digital consulting service. One the other hand, the Niebe case study shows that the FO did not need to mobilize DSIC 4 due to the continued support of its partner. However, the FO did not possess the sub-capabilities that constitute this DSIC, which calls into question its ability to ensure the sustainability of the service if the partnership had to end. This said, the need to strengthen service providers capability to ensure the sustainability and scaling up of digital advisory services is not unique to Burkina Faso. It is seen as a major challenge in southern countries (Steinke *et al.*, 2020), including Tanzania (Ortiz-Crespo *et al.*, 2020) and Kenya (Kieti *et al.*, 2022).

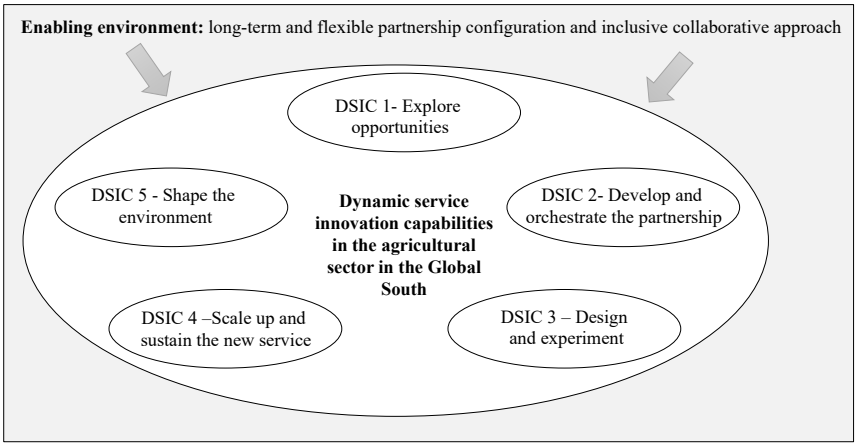
Relevance of the Contextualized Framework of Dynamic Service Innovation Capabilities and Potential Improvements

The operationalization and contextualization of DSICs that we have undertaken also constitutes a major advance for digital agro-advisory service providers in the South. It allows them to identify the organizational weaknesses hindering their innovation process, and then to strengthen them. Studies in other southern countries suggest that this contextualized framework of DSICs is relevant for service providers with similar characteristics to the one studied (mainly the limited resources of local providers, and the resource and power asymmetries characterizing the partnerships). Among others, McCampbell *et al.* (2021) stress the importance for innovative service providers of clearly identifying user expectations, as assessed by DSIC 1. They also emphasize the importance of developing service providers' capabilities to effectively engage in decision-making processes and enforce their data rights (two micro-foundations of the DSIC 2) and to fully participate in the design and development of innovative digital consulting services (measured here by DSIC 3). However, the assessment indicators identified in Burkina Faso should be selected with the service providers concerned, as was done in this study.

As our research on DSICs in southern countries remains exploratory, it still requires to be enriched and tested on a larger scale to reflect the diversity of situations of agricultural service providers in the South. Our results on the influence of international development partnerships suggest, for example, that, in addition to the four core DSICs identified above, service providers in countries of the Global South would also require specific dynamic capabilities to shape the environment in which they operate. This would help them

create partnership configurations that are more aligned with their interests and capabilities (see Figure 4 below).

Figure 4 – Five core dynamic service innovation capabilities in the agricultural sector in the Global South and characteristics of enabling environments



This need has been identified in the case of agricultural innovation in the South by Toillier *et al.* (2020), but the micro-foundations of this capability remain to be identified. Nenonen *et al.* (2018) identified in a northern context three capabilities that allow organizations to proactively develop more efficient partnerships ('visioning', 'timing', and 'influencing laws, norms and regulations'). Future studies could test whether these capabilities are relevant in a southern context and explore the nature of their micro-foundations.

Moreover, we only tested the validity of this framework for farmer organizations providing advisory services. Yet agricultural advisory services are offered by a variety of organizations (including the State and private firms) whose resources and functioning differ from those of the FOs studied. Future studies could therefore test the validity of this framework for other types of advisory providers, but also for providers of other types of agricultural services (*e.g.* financial services, machinery rental or supply of fertilizers).

Managerial Recommendations to Develop Partnerships Better Enhancing the Capabilities of Service Providers in the South

This article reveals the influence of international development partnerships on the ability of service providers to mobilize their DSICs. A longer and more flexible partnership configuration and an inclusive collaborative

approach appeared to be more conducive to the valorization of local service providers' capabilities. Yet the two case studies showed that the local service providers were not involved in the choice of hardware and software, nor in the discussions with the firm developing the digital platform. Moreover, the service providers and their partners did not properly anticipate the end of their partnership, nor designed an exit strategy, a shortcoming commonly observed in innovation partnerships in the Global South (Fee, 2012). There is therefore a need to design partnerships that are more suited to enhance local service providers' DSICs. In this view, we provide the following managerial recommendations. In line with the work of Toillier *et al.* (2018) and Triomphe *et al.* (2016), we invite the organizations designing innovation partnerships in the Global South (including development agencies, international organizations, and development research institutes) to rethink the configuration of these partnerships and the modalities of supporting these innovation processes. In order to better leverage service providers' DSICs, it would seem beneficial to extend the duration of partnerships and allow more flexibility in the conduct of activities. This would allow partners to embrace failures and unforeseen events that are inevitable in innovation processes but constitute real opportunities to learn (Vinck, 2017). Innovation partnerships should therefore be evaluated not only on the basis of their relevance, efficiency, effectiveness, and impacts, but also on their ability to learn from failures and effectively mobilize and strengthen stakeholders' capabilities. We also stress the need to dedicate specific resources and time for innovation capacity development and to develop new management tools to facilitate open innovation in countries of the Global South. For instance, Arkesteijn *et al.* (2015) suggest how logical frameworks could be used to foster learning within such partnerships. Finally, an exit strategy should be defined before the end of the partnership project, specifying the capabilities to be strengthened during and after the partnership, in order to ensure the sustainability of the service that has been developed.

Conclusion

In this study, we proposed to operationalize and contextualize the framework of dynamic service innovation capabilities (DSICs) in the Global South. We developed a framework identifying the micro-foundations of these DSICs with two farmer organizations who were innovating their agro-advisory service using digital technologies. We used it to examine a case study where the new service fully met user expectations (successful service innovation) and one where the farmer organization succeeded in digitalizing its service

but without fully meeting user expectations (incomplete service innovation). This allowed us to confirm the importance of the four DSICs identified, namely the ability to explore opportunities; to develop and orchestrate the partnership; to design and experiment; and to scale up and sustain the new service. We showed, moreover, that the two partnerships studied limited farmer organizations' involvement in the development of the new digital services, thus preventing them from mobilizing their capability to design and experiment. However, our results suggest that an inclusive collaborative approach and a longer, more adaptable partnership configuration with more limited accountability requirements (as seen in the Niebe case study) is more appropriate to valorize local organizations' capabilities than an approach of technology transfer and a short-term partnership configuration, with a high degree of accountability (as in the Cotton case study). This led us to formulate recommendations to design international development partnerships that enhance local service providers' capabilities. This includes rethinking partnerships' duration and their mode of evaluation and dedicating specific resources to conduct activities of collective experimentation and capacity development. We also invite service providers and their partners (1) to assess their dynamic service innovation capabilities to determine those that can be mobilized and those that need to be strengthened; and (2) to define an exit strategy specifying the capabilities to be strengthened before the partnerships end, in order to ensure the sustainability of the new services. For future research, we propose to enrich the contextualized framework of DSICs, by exploring service providers' capabilities to develop partnership configurations that are more aligned with their own interests and capability development needs; and to test its validity for other types of advisory service providers in southern countries (including States and private firms) and for other types of agricultural services (*e.g.* financial services, the rental of machinery rental or the supply of fertilizers).

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