How to assess the dynamic capabilities needed to orchestrate a service ecosystem? A new methodology and framework

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Résumé :

Pour accélérer les transitions agroécologiques dans le secteur agricole, il est crucial d'accompagner les innovations et la coordination de cet accompagnement, bien que nécessaire, pose de nombreux défis et nécessite des capacités spécifiques. Il est donc important d'évaluer si l'organisation qui coordonne a les capacités nécessaires pour assurer ce rôle. Cependant, évaluer des capacités représente un défi tant théorique que méthodologique. Une difficulté principale tient à la divergence entre les modèles d'évaluation des capacités proposés par la littérature scientifique et ceux utilisés par les praticiens. Cet article intègre ces deux perspectives afin de développer un modèle conceptuel global grâce à une méthodologie en 4 étapes : (i) une revue de littérature ; (ii) un atelier avec des chercheurs et experts de terrain ; (iii) application à un cas d'étude pour perfectionnement ; et (iv) la comparaison avec les modèles de capacités d'autres secteurs pour identifier les capacités génériques. Le modèle qui en résulte constitue un outil précieux pour évaluer les capacités requises par les organisations hubs dans les écosystèmes de services accompagnant l'innovation agricole. En outre, la méthodologie fournit des orientations aux chercheurs et aux praticiens qui souhaitent concevoir des modèles de capacités pour d'autres types d'organisations.

Mots-clés : Méthodologie – Évaluation de capacités – Capacités dynamiques – Organisation hub – Ecosystème de Services

Abstract

To accelerate sustainability transitions in the agricultural sector, supporting innovations appears to be crucial and coordinating this support is necessary while posing several challenges and requiring specific capabilities. It is thus important to assess if the coordinating organisation has the necessary capabilities to endorse this role. Yet, assessing capabilities constitutes a theoretical and methodological challenge. A key difficulty lies in the divergence between capability models proposed in academic literature and those applied by practitioners. This article integrates both perspectives to develop a comprehensive conceptual model, following a four-step methodology: (i) a literature review, (ii) a workshop with field experts, (iii) application to a case study for refinement, and (iv) comparison with capability models from other sectors to identify generic capabilities. The resulting model offers a valuable tool for evaluating the capabilities required by hub organisations in service ecosystems supporting agricultural innovation. Additionally, the methodology provides guidance for researchers and practitioners aiming to design capability models for other types of organisations.

Keywords

Methodology – Capability assessment – Dynamic capabilities – Hub organisation – Service ecosystem

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1. INTRODUCTION

Agriculture faces significant Grand Challenges in achieving the Sustainable Development Goals (SDGs), particularly in the Global South (Ferraro et al., 2015; George et al., 2016). Among these challenges, transitioning towards more agroecological practices is increasingly recognised as necessary to enhance agricultural resilience to face climate change, resource constraints, and socio-economic vulnerabilities. This transition demands not only technological advances but also multidimensional innovations creating social, environmental, and economic value. Such innovations often require adapting existing inventions or models developed in other contexts, making their implementation particularly complex. Moreover, they depend on novel socio-organisational arrangements, which are inherently challenging to design and sustain.

While innovation support service providers (ISSPs) play a key role in fostering agricultural innovation (Audouin, Dugué, et al., 2021; Soulé Adam et al., 2023), no single actor possesses all the resources required to comprehensively support innovators. Consequently, innovation support systems must adopt a collaborative approach, particularly in resource-constrained environments, where there is a clear impetus to "unite forces" to improve the overall innovation ecosystem (Faure et al., 2019; Kilelu et al., 2014). This has led to the development of inter-organisational collaborations, which can be characterised as services ecosystems (Orbell et al., 2024b; Vargo et al., 2015; Vargo & Lusch, 2011). However, innovation support actors are diverse, including agricultural professionals (Candemir et al., 2021; Iyabano et al., 2021), research organisations (Audouin, Raharison, et al., 2021), and the private sector (Audouin,

Dugué, et al., 2021), and public policymakers (Diesel & Miná Dias, 2016). This diversity gives rise to collaboration challenges that can hinder the emergence of the ecosystem.

Within these ecosystems, the role of a hub organisation is pivotal to orchestrate the ecosystem's emergence and functioning, addressing two central challenges (Foss et al., 2023). First, it resolves coordination problems, such as determining who should perform specific tasks, when, and at what scale. Second, it tackles cooperation problems by motivating actors to engage in coordinated and innovative efforts. These issues cannot be resolved by market mechanisms alone, necessitating a deliberate form of ecosystem leadership, often referred to as orchestration (ibid).

To effectively fulfil this role, hub organisations must possess specific capabilities (Möller et al., 2020). This focus on capabilities is underpinned by several theoretical justifications. First, the study of capabilities bridges the gap between resources and organisational performance, as resources alone are insufficient to explain performance. Instead, understanding how resources are mobilised is critical (Amit & Schoemaker, 1993; Barney, 1991). Second, the concept of dynamic capabilities provides a framework to analyse how organisations dynamically adapt to contexts of uncertainty and rapid change (Eisenhardt & Martin, 2000; Teece et al., 1997). Third, the capabilities perspective shifts the focus from purely outcome-based evaluations to the processes that drive those outcomes, emphasising the role of specific routines, collective competencies, and conscious management of organisational complexity (Dosi et al., 2001). Unlike more static and descriptive frameworks, such as behavioural theory (Cyert et al., 2006), dynamic capabilities allow for a more proactive analysis of organisational adaptation and evolution.

Furthermore, given the interdependence of organisations in achieving sustainability objectives, analysing the necessary capabilities to manage inter-organisational collaborations becomes crucial. This perspective moves beyond the individual organisation to encompass broader

scales, such as value chains or ecosystems (Correggi et al., 2024). While several studies highlight the importance of hub organisations possessing dynamic capabilities to orchestrate a service ecosystem, the operationalisation of this concept and its evaluation remain significant theoretical and methodological challenges (Laaksonen & Peltoniemi, 2018). This is particularly true for service ecosystems supporting innovation in the Global South, which remain underexplored in the management science literature.

This article addresses the following research question: *What dynamic capabilities are required by a hub organisation to orchestrate a service ecosystem, and how can these capabilities be effectively evaluated?*

In the first section, we provide a synthesis of the literature on the functions performed by hub organisations within service ecosystems and the challenges of operationalising and evaluating dynamic capabilities. In the second section, we present the data collection of the four-steps methodology employed to design and test our framework. Then in the result section we develop the inputs of each step and present the framework for evaluating dynamic capabilities needed to orchestrate Innovation Support Service Ecosystems (ISSEs). Finally, we discuss the genericity and specificity of our capabilities compared to other sectors and present the contributions and limits of our paper.

2. THEORETICAL BACKGROUND

2.1. HUB ORGANISATION – A CRUCIAL ACTOR

This study examines the function of hub organisation within the Innovation Support Service Ecosystem (ISSE), a central entity responsible for coordinating and enabling ecosystem functions. Although its conceptualisation varies across theoretical frameworks in management science, its fundamental role remains consistent.

In the Service-Dominant Logic, the hub is described as an “initiator” or “active provider of value” (Ekman et al., 2016), emphasising its contribution to value co-creation. Meta-Organisation theories define it as a “central actor” or “focal firm” (Gulati et al., 2012; Valente & Oliver, 2018), highlighting its role in shaping governance and coordinating diverse actors. Similarly, network theories refer to it as a “hub firm” (Dhanaraj & Parkhe, 2006), “catalysing agent” (Ekboir & Cruz, 2012), or “lead organisation” (Popp et al., 2014; Provan & Kenis, 2007), focusing on its ability to facilitate collaboration and strategic alignment.

Ecosystem theories conceptualise the hub as an “ecosystem leader” (Moore, 1993) or a “keystone” (Iansiti & Levien, 2004), responsible for maintaining ecosystem stability and productivity. In communities of innovation, it is termed a “leader firm” (Grab, 2017), reflecting its role in driving collaborative innovation. Furthermore, Foss et al. (2023) emphasise "leaders" and "leadership" in innovation ecosystems, aligning closely with the hub organisation's orchestration functions despite differing terminology.

2.2. DYNAMIC CAPABILITIES: WHAT ARE THEY AND WHAT ARE THEY FOR

Research on dynamic capabilities (DC) began with the seminal work of Teece et al. (1997, p.516), who defined them as "*the firm’s ability to integrate, build, and reconfigure internal and external competences to address rapidly changing environments*". Since then, three primary approaches have emerged to characterise and assess DC.

The first approach, proposed by Teece, identifies three core capabilities: (i) sensing, the ability to detect opportunities and threats; (ii) seizing, the capacity to exploit opportunities through strategic actions; and (iii) transforming, the capability to reconfigure resources to align with environmental changes. These capabilities enable organisations to remain competitive in turbulent environments.

The second approach focuses on hierarchical frameworks, recognising varying levels of complexity among capabilities (Nenonen et al., 2018; Teece, 2007; Winter, 2003) (see *Table 1*). At the most basic level, zero-order capabilities involve routines that maintain stability in static environments. First-order capabilities enable adaptation to environmental changes by extending or modifying existing capacities (Winter, 2003). At the highest level, second-order capabilities allow organisations to reshape their environments proactively. For example, Teece (2007) and Foss et al. (2023) link second-order capabilities to ecosystem leadership, highlighting their role in reshaping external contexts.

Table 1: The three hierarchy-level of capabilities and their adaptation in our context

Hierarchy of capability	**Literature: firm context**	**Our context**
Ordinary	"*The capabilities exercised in that stationary process are the zero-level capabilities, the 'how we earn a living now' capabilities*." (Winter, 2003)	Enable the hub organisation to perform its core functions effectively in stable environments
Dynamic / 1st order	"[…] *those that operate to extend, modify or create ordinary capabilities*." (Winter, 2003)	Allow the hub organisation to adapt to changing environments, ensuring it continues to provide effective support to the ecosystem
2nd order	"*the enterprise's capacity to shape the ecosystem it occupies*" (Teece, 2007, p. 1320)	Enable the hub organisation to reshape its external environment, enhancing its ability to orchestrate and lead the ecosystem effectively

The third approach examines the components of DC, introducing micro-foundations as the building blocks that underpin dynamic capabilities (Helfat & Peteraf, 2015; Kindström et al., 2013; Teece, 2007). Micro-foundations include distinct processes, skills, and decision-making structures (Teece, 2007) offering a tangible and operational perspective (Fallon-Byrne & Harney, 2017; Pierre, 2018). This framework integrates individual and organisational actions (Barney & Felin, 2013; Eisenhardt et al., 2010) and enables a detailed understanding of the mechanisms driving adaptability. Beyond micro-foundations, scholars have distinguished between core capabilities and the sub-capabilities or meta-capabilities they encompass.

(Alexandre et al., 2022) argue that core capabilities serve as overarching constructs, comprising multiple sub-capabilities that can be assessed through their micro-foundations.

Despite these advances, gaps remain in linking dynamic capabilities to inter-organisational relationships (Burlaud, 2022; Möller et al., 2020), in particular those required for ecosystem orchestration (Möller et al., 2020); and in developing robust methods for assessing these capabilities. In agriculture, existing research focuses on evaluating the capacities needed for innovation (Tropical Agriculture Platform, 2016), and the capacities required to support innovation (Agrinatura & FAO, 2019; Audouin, Raharison, et al., 2021; Mathé et al., 2023; Toillier & Kola, 2018). However, little attention has been given to the capacities necessary to orchestrate ecosystems of innovation support. Addressing this gap is crucial for understanding how collaborative ecosystems can drive systemic innovation and sustainability in agriculture.

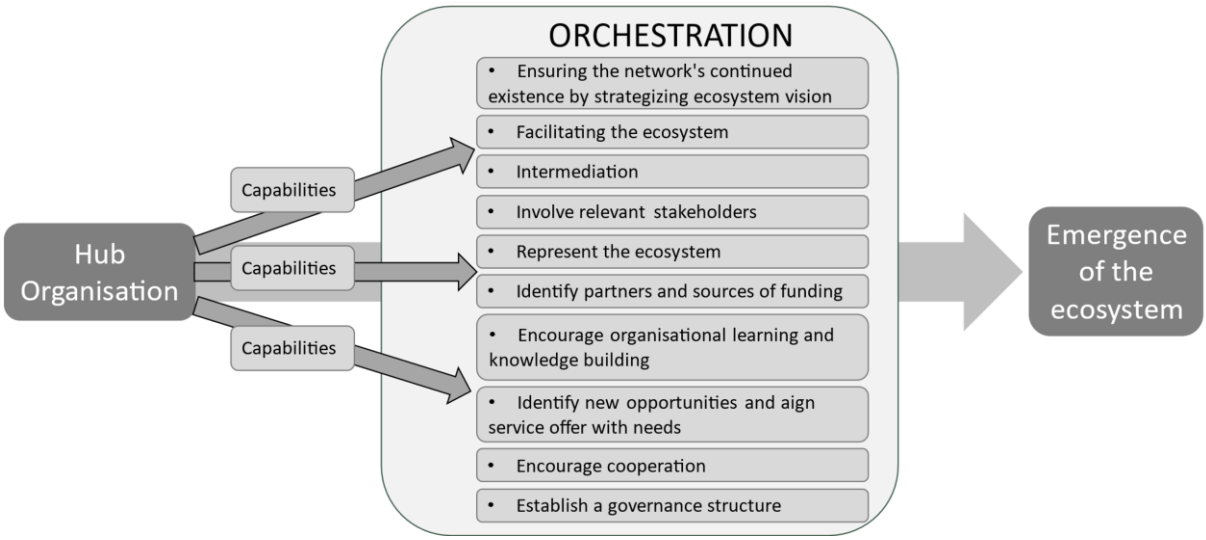
2.3. ROLE OF THE HUB ORGANISATION IN AN ECOSYSTEM – ORCHESTRATION AND BUILDING SOCIAL CAPITAL

Building on the definitions previously presented, this study conceptualises capabilities as the essential attributes that enable the hub organisation to fulfil its various roles in orchestrating the emergence and functioning of the ecosystem. This framing aligns with Nyström et al.'s (2014, p. 484) definition of roles as "*behaviors expected of parties in particular positions*", which highlights the behavioural dimension of the hub organisation's functions.

Through this lens, the hub organisation's capabilities are viewed as the foundational mechanisms that enable it to fulfil the complex and multifaceted responsibilities associated with ecosystem leadership to allow ecosystem emergence (see *Figure 1*). These different responsibilities have been extensively described in the scientific literature: from ensuring the network's continued existence by strategizing a shared ecosystem vision (Orbell et al., 2024a; Ozor et al., 2024; Ritala et al., 2023; Shen et al., 2024), to identifying relevant stakeholders and involving them (Ekboir & Cruz, 2012; Hurmelinna-Laukkanen et al., 2022; Orbell et al.,

2024a), and to encouraging cooperation by limiting opportunistic behaviour and fostering trust (Daymond et al., 2023; Orbell et al., 2024a).

Figure 1: Conceptual diagram describing how the Hub Organisation fulfils or delegates key roles to orchestrate Ecosystem emergence



2.4. CAPABILITY ASSESSMENT

Literature on dynamic capabilities points out that one of the main criticisms of this theory is its lack of operationalisation, as capabilities are inherently difficult to measure (Janssen et al., 2016; Teece, 2007). As presented before, to address this critique, some researchers have proposed examining the micro-foundations of capabilities, which are more easily operationalised and thus more straightforward to evaluate (Barney & Felin, 2013; Fallon-Byrne & Harney, 2017; Teece, 2007). In the grey literature, in addition to the term "foundations" of capabilities – what Teece refers to as micro-foundations – other proxies are identified to characterise the presence and quality of a capability, namely: "triggers", "inputs" and "outcomes". Triggers are the set of activities undertaken to build the capability, such as knowledge acquisition, updating, and practical application. Input-based assessment relies on the evaluation of the financial and human investments in capability enhancement (Boly et al., 2014; Hagedoorn & Cloodt, 2003; Kleinschmidt et al., 2007). Outcome-based evaluation, on the other hand, assesses the presence or quality of the expected results of a capability (Fernez-

Walch & Romon, 2016; Pierre, 2018). If the intended outcome is present, it can be inferred that the capability was present at a sufficient level.

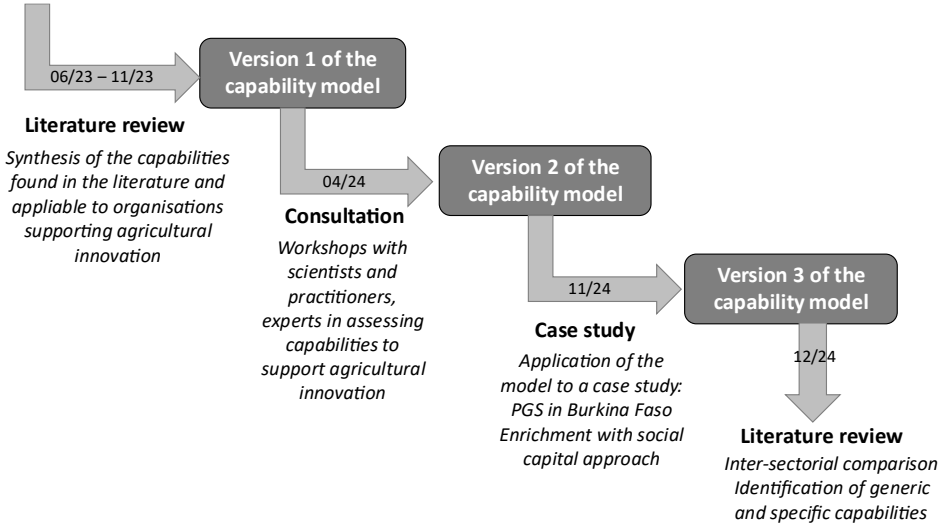
Only a small proportion of articles in the scientific literature go as far as evaluating the capabilities suggested in their models. When they do, the data acquisition methods (such as surveys, questionnaires, or secondary data) and sampling are typically detailed, but the concrete evaluation methods for the capabilities are rarely specified. We identify this as a methodological gap, as explicit assessment methods would allow for constructive critique – a key aspect of research – on how researchers have assessed capabilities thus far. Additionally, clearer evaluation methods would enable other researchers in the field to understand the strengths and limitations of each method.

3. METHODOLOGY: CONSTRUCTION OF AN ASSESSMENT MODEL OF DYNAMIC CAPABILITIES

3.1. A FOUR-STEPS METHODOLOGY

To answer the identified gap of understanding the connection between dynamic capabilities and ecosystem orchestration, especially in the context of services ecosystems supporting agricultural innovation in the Global South, we propose an iterative methodology composed of four steps (see *Figure 2*).

Figure 2: Iterative methodology to build an assessment model of dynamic capabilities



The first step in building the model was a non-systematic literature review of publications on capability assessments, with a focus on dynamic capabilities: specifically, we explored which dynamic capabilities are considered and evaluated in the management science literature. Through this process, we identified 14 academic papers that provide relevant insights into the topic (Argyres & Mayer, 2007; Day & Schoemaker, 2016; den Hertog et al., 2010; Janssen et al., 2016; Kindström et al., 2013; Lichtenthaler & Lichtenthaler, 2009; Linde et al., 2021; Lütjen et al., 2019; Murray et al., 2022; Nenonen et al., 2018; Sandberg et al., 2021; Sjödin et al., 2024; Teece, 2007; Zollo & Winter, 2002). Additionally, we included two grey literature sources (Agrinatura & FAO, 2019; Toillier & Kola, 2018) which also assess organisational capabilities. We gathered the capabilities identified in the 16 papers and identified the ones appliable to the hub organisations of agricultural ISSE to build a first version of our capability model.

Next, we organised a workshop to seek feedback from both researchers focused on capability assessments (n=5) and practitioners (n=2) involved in designing and implementing capability assessment tools in the agricultural sector in the Global South. To facilitate broad participation from practitioners based in this region, we conducted an online participatory workshop, using the Klaxoon application to encourage active engagement and collective input. The workshop was organised in three stages, each targeting specific objectives: (i) refining the model of proposed capabilities, (ii) prioritising capabilities to reduce the model's scope and enhance its practical applicability, and (iii) characterising potential methods for assessing the identified capabilities.

Following the expert workshop, we applied the capability assessment model to a case study to see whether the assessment through the capability model was consistent with empirical observations made on the case study. The data used consists of secondary data derived from semi-structured interviews with relevant member organisations to explore the functioning of ISSE, focusing on aspects such as the role of hub organisations, the challenges they face, and

the development of social capital, among other topics. Interviews were transcribed and coded using the concept of social capital, as outlined in Orbell et al. (2024). This approach provides a new perspective on the essential capabilities required for the effective operation of the ecosystem. One of the key roles of a hub organisation is to foster the necessary social capital among member organisations, thereby enabling the smooth functioning of the entire system. Through this process, the hub facilitates collaboration, trust-building, and resource sharing, all of which are critical for the sustainability and success of the network. The collected data, along with an extensive review of available secondary data on the ecosystem and its achievements, allowed to assign a score to each of the sub-capabilities to fill-in the capabilities assessment model. Each sub-capability is considered to contribute equally to the constitution of the capability. The capability score is therefore calculated as the average of the sub-capabilities that make up the capability.

Finally, we conducted a second literature review on capabilities in diverse sectors of the economy to identify which capabilities were generic and which were specific to the agricultural sector.

3.2. PILOT CASE SELECTED

The selected case study is an Innovation Support Service Ecosystem (ISSE) that supported the establishment of a Participatory Guarantee System (PGS) in Burkina Faso, known as BioSPG. PGS initiatives aim to enable market differentiation for organic or agroecological agricultural products. Primarily intended for the national market, PGSs are labelling systems jointly created by stakeholders within the agricultural sector – including farmers, collectors, processors, sellers, consumers, and public actors. These stakeholders are also responsible for conducting inspections in the farms, creating a system that is both collectively governed and regulated.

The establishment of BioSPG in Burkina Faso can be classified as an "umbrella innovation," given that it is an organisational innovation inherently tied to multiple, diverse types of

innovations. These include technical innovations – such as changes in agricultural practices and techniques, and the creation and marketing of organic inputs – organisational innovations with new structures of producer organisations and value chains innovations through the development of new supply chains, and new commercialisation models.

This case study was chosen because it represents a "successful" and "high performing" example of an ISSE. This success is indicated by the ecosystem's ability to fulfil its purpose, with the hub organisation effectively supporting its activities. However, despite its success, both the ecosystem and the hub organisation continue to face various challenges and areas for improvement. Thus, we do not expect all capabilities of the hub organisation to be fully developed or at their optimal level. Rather, we anticipate that most will be adequately established. It can also be inferred that any capabilities found to be absent or rated as very weak may not be essential, as their lack or limited quality has not prevented the ecosystem from functioning effectively.

4. RESULTS

4.1. LITERATURE REVIEW ON DYNAMIC CAPABILITIES AND THEIR ASSESSMENT

Our analysis compared 16 capability frameworks (*Table 1*), developed across different contexts. Among them, seven frameworks describe capabilities related to ecosystem or network management. All frameworks from the scientific literature were developed with firm-centric environments in mind (such as industries, service provision, smart cities, biofuels, and energy), with only one focusing on agriculture and none oriented towards countries of the Global South. By contrast, the two frameworks from the grey literature were developed to assess the capabilities of agricultural organisations in the Global South. Additionally, only two

frameworks specifically address the capabilities of hub organisations (Day & Schoemaker, 2016; Linde et al., 2021).

These frameworks also vary in their level of assessment: some describe capabilities themselves, while others introduce micro-foundations, sub-routines, sub-capabilities, or capability hierarchies (0-order, 1st-order, 2nd-order). Approximately half of the papers propose capability models without applying them, while the other half assess capabilities, often using Likert scales in self-administered questionnaires or during interviews or focus groups.

This initial review of frameworks allowed us to identify a broad range of capabilities from the literature, some of which were not suitable for our context of hub organisations in service ecosystems supporting agricultural innovation in the Global South. Consequently, we refined our model by removing irrelevant capabilities, adapting others, and adding new capabilities to better describe our research subject. This process allowed to identify a first set of capabilities of hub organisations to orchestrate an ecosystem.

Table 2: Comparison of thirteen frameworks of capability assessment from the scientific and grey literature

	Type of literature	**Capability related to ecosyst. or network mngt.**	**Organisation considered**	**Context**	**Focusing on hub organisation**	**Assessment of the capabilities**
Zollo & Winter, 2002	Scientific	No	Private firm	Global North, not agriculture	No	No
Argyres & Mayer, 2007	Scientific	No	Private firm	Global North, not agriculture	No	No
Teece, 2007	Scientific	No	Private firm	Global North, not agriculture	No	No
Lichtenthaler & Lichtenthaler, 2009	Scientific	Yes	Private firm	Global North, not agriculture	No	No
den Hertog et al., 2010	Scientific	No	Private firm	Global North, not agriculture	No	No
Kindström et al., 2013	Scientific	No	Private firm	Global North, not agriculture	No	Yes, interviews, focus groups and secondary data
Janssen et al., 2016	Scientific	No	Private firm	Global North, not agriculture	No	Yes, self-administered questionnaire
Day & Schoemaker, 2016	Scientific	ND	Private firm	Global North, not agriculture	Yes	Yes, secondary data
Nenonen et al., 2018	Scientific	Yes	Private firm	Global North, agriculture	No	Yes, self-administered questionnaire
Toillier & Kola, 2018	Grey	No	Support services provider	Global South, agriculture	No	Yes, self-administered questionnaire
Lütjen et al., 2019	Scientific	Yes	Private firm	Global North, not agriculture	No	Yes, questionnaires lickert scales

Agrinatura & FAO, 2019	Grey	Yes	Support services provider	Global South, agriculture	No	Yes, interviews and lickert scales
Linde et al., 2021	Scientific	Yes	Private firm	Global North, not agriculture	Yes	No
Sandberg et al., 2021	Scientific	Yes	Private firm	Global North, not agriculture	Yes	No
Murray et al., 2022	Scientific	Yes	Diverse	Global North, not agriculture	No	Yes, interviews, observations
Sjödin et al., 2024	Scientific	Yes	Private firm	Global North, not agriculture	Yes	No

4.2. EXPERTS WORKSHOP TO REFINE THE CAPABILITY MODEL AND COMPARE VARIOUS ASSESSMENT APPROACHES

During the workshop, we began by introducing key concepts to establish a shared vocabulary, alongside an overview of the current knowledge on innovation support service ecosystems and their hub organisations. This was followed by a presentation of the current state of the capability model. Participants then engaged in an individual reflection phase, suggesting improvements to the model, such as adding capabilities, reclassifying certain capabilities within the model, and reformulating or clarifying existing capabilities. After this, a discussion session allowed participants to exchange thoughts on the suggested revisions. In the prioritisation phase, participants identified the essential capabilities for the model, aiming to streamline it for clarity and practical use, with a focus on the core capabilities an organisation should possess. A second discussion session followed, in which participants reviewed and compared their prioritisations. Finally, participants reflected on the potential methods for assessing capabilities, exploring the advantages and disadvantages of each approach.

This workshop enabled us to refine the model, by grouping related capabilities, facilitating a more organised and coherent structure for analysis. In addition, the study has enabled the prioritisation of certain capabilities based on their perceived importance in relation to the roles they enable within the ecosystem. For instance, if the role of co-creating a shared vision with ESSI members is considered fundamental, then the capability to co-create this vision is similarly deemed crucial. Furthermore, the study has contributed to the inclusion of new dynamic capabilities, which are particularly significant in the context of an Innovation Support Services Ecosystem. Out of the 14 capabilities considered, only two remained unchanged and unrefined after the workshop. Additionally, it emerged that the classification initially proposed

for the model – differentiating capabilities related to building social, financial, and cognitive capital – was not optimal.

Finally, this workshop advanced knowledge and dialogue on potential methods for capability assessment. Indeed, practitioner observations revealed that capabilities are often abstract concepts that can be challenging for respondents to assess, as they may struggle to identify the presence, absence, or quality of a capability within their organisation. During the workshop, participants were invited to share their perspectives on using the different methods used in the literature, identifying cases where each was most suitable, as well as the advantages and disadvantages they had observed in applying them (summarised in *Table 3*).

Table 3: A comparison of methods and proxis to assess capabilities

	Description	**Context of use**	**Advantages**	**Drawbacks**
(Micro)-foun-dations	The knowledge, attitudes and practices which constitutes a capability Ex: *Meetings are organised to co-create the vision* Ex: *Hub organisation is able to formalise a vision for ESSI*	In a reflexive attitude, prior to capability enhancement	Capability appears more concrete for interviewees Fine analysis of the situation	Wording is crucial for interviewees to understand the capability (examples can be useful) Identification of all micro-foundations can be difficult and hard to implement if numerous capabilities
Triggers	Activities allowing the capability to develop (acquiring necessary knowledge, putting in practice and updating this knowledge, reflecting on the results) Ex: *Hub organisation has received training in facilitating the process of co-creating a vision*	In a reflexive attitude, prior to capability enhancement	Questions are easily understandab le for the interviewees	Doesn't allow to know if the capability is truly acquired Doesn't allow to know if the capability is implemented, nor identify hindrances for their implementation
Inputs	Human and financial investments to develop capabilities	In a reflexive attitude or to take strategic decisions	Easy to understand for interviewees	Doesn't allow to know if the capability is truly acquired Can't be the only explanation to the

	Ex: *There are new recruitments or trainings organised to develop capabilities*		as it is tangible (money, time)	development or enhancement of a capability
Outcomes	Quality or performance of what the capability contributed to create Ex: *A written document sets out the vision or operational plans flow from the vision*	To evaluate (prior to or after financing activities)	Easier to understand for interviewees, linked to a concrete relation	Necessary to collect information previously on the possible outcomes The absence of the outcome cannot be directly related to the absence of the capability. The capability may be present but other factors can hinder the onset of the outcome

Each method for capability assessment offers distinct advantages and limitations, with the choice depending on the context and objectives of the analysis. Outcome-based methods are effective for assessing the presence or absence of a capability or for comparing organisations based on their capabilities – for example to identify the organisation best suited to orchestrate an ecosystem. However, for a more reflective approach aimed at understanding gaps and strengthening capabilities, methods based on triggers, inputs, or micro-foundations are more appropriate.

The choice of assessment method can also risk distorting results. For example, outcome-based assessments rely on appropriate proxies; if the outcomes are not relevant, they may falsely suggest a capability's absence. In assessing a hub organisation's capability to co-create an ecosystem vision, the absence of a documented vision might incorrectly indicate a lack of this capability, even if a shared vision exists informally. Similarly, evaluating capabilities through micro-foundations requires a thorough understanding of their components. Missing key micro-foundations could lead to "false positives," where a capability appears present despite lacking critical elements.

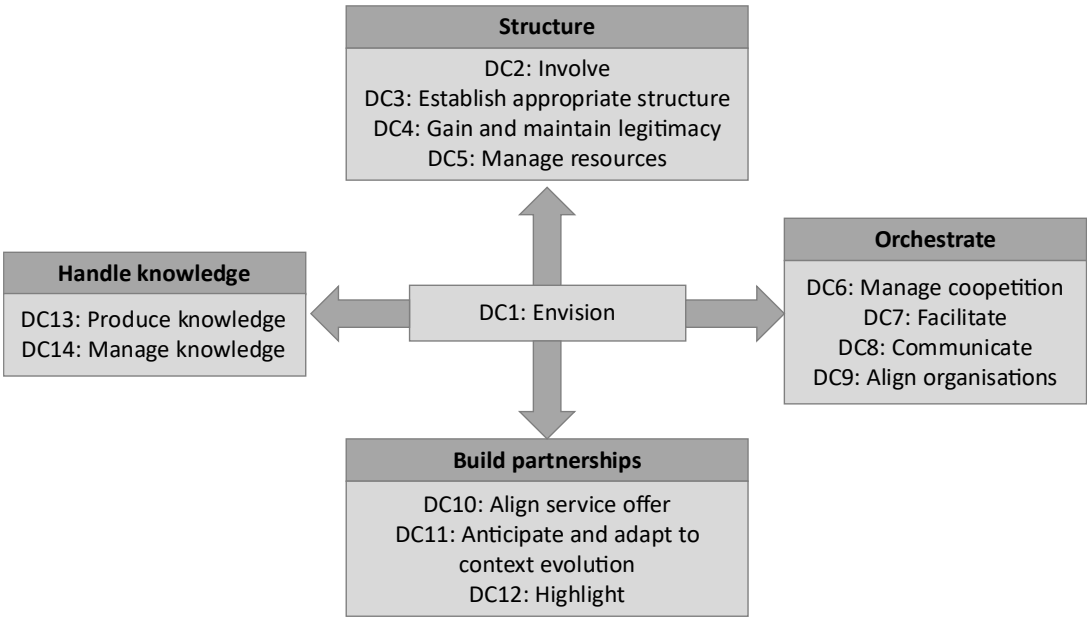
The number of capabilities being assessed and the available resources also influence method selection. Micro-foundation-based assessments, while detailed, can be resource-intensive, especially when evaluating multiple capabilities. Moreover, some capabilities are too intangible for outcome-based methods or may yield biased results. For instance, measuring the number of meetings held to evaluate a hub's facilitation capability ignores the quality and productivity of these interactions. To ensure accurate and nuanced assessments, a mixed-methods approach combining multiple evaluation modes is recommended.

Common data collection methods include self-administered questionnaires and structured interviews, though semi-structured or open-ended interviews and secondary data can also be used. Responses may range from binary answers (presence/absence) to ratings on Likert scales, depending on the capability and evaluation method.

4.3. CONCEPTUAL MODEL OF DYNAMIC CAPABILITIES NEEDED BY THE HUB ORGANISATION

These stages have enabled us to develop a capability model (represented in *Figure 3*) consisting of 14 dynamic capabilities, organised into four groups of what may be termed "meta-capabilities": Structure, Orchestrate, Build partnerships, and Handle knowledge. At the heart of this model lies a central and foundational capability: Envision as we will detail hereafter.

Figure 3: Capability model of the dynamic capabilities needed by the Hub organisation orchestrating an Innovation Support Services Ecosystem in the Global South



Capability to envision

The capability to envision focusses on creating and maintaining a shared vision within the ecosystem, with three key sub-capabilities. First, it involves collaboratively constructing a strategic vision with all current ecosystem members. This vision provides a unifying purpose, aligning with the values and goals of member organisations while being compatible with their individual goals and strategies. A vision created by only a few actors risks failing to engage those not involved in its development. Second, the capability requires the clear articulation and dissemination of the vision to ensure all members recognise and identify with it. While it may be formalised in strategic documents, the vision is often communicated informally within and beyond the ecosystem. Finally, translating the vision into operational objectives is essential for practical implementation. This step entails identifying and planning concrete actions to achieve the shared vision, though it is often challenging.

In the capability model, the capability to envision plays a central role, positively influencing other capabilities. It encourages new members to collaborate (DC2), fosters cooperation and mitigates opportunistic behaviours (DC6), and helps resolve misunderstandings or conflicts (DC8). Additionally, it aligns service offerings (DC10) and underpins external communication and advocacy efforts (DC12), serving as a foundation for engagement with funders and institutions.

Meta-capability to structure

One of the primary roles of a hub organisation within an Innovation Support Service Ecosystem (ISSE) is to provide the structure necessary for the ecosystem to function. This involves identifying and engaging relevant actors, ensuring the ecosystem's members are diverse and multidisciplinary to offer a wide range of services that address innovators' needs (see *Table 4*). However, engaging all types of actors can be challenging, as some may not immediately perceive the benefits of participation, while the constraints, such as time and resource commitments, are more apparent. Thus, hub organisations must motivate and mobilise actors to secure their active involvement (DC2 – Involve).

The hub must also manage the entry and exit of organisations within the ecosystem. The inclusion of new actors may introduce valuable skills and fresh perspectives but risks disrupting existing agreements, potentially leading to "cooperation fatigue" among long-standing members. Conversely, the departure of actors, particularly in resource-constrained Global South contexts, can destabilise the ecosystem by depleting resources or expertise, especially as many ecosystem actors depend on short-term development project funding. Managing such transitions is therefore critical.

Moreover, the hub organisation must have the capability to establish a structure (governance, formalisation hierarchy) that is appropriate and satisfactory for all ecosystem members (DC3 – establish appropriate structure). This capability encompasses three critical sub-capabilities. First, the hub must identify and implement a governance model that supports the effective functioning of the Innovation Support Services Ecosystem (ISSE). Whether the governance is horizontal or hierarchical, it must align with the preferences of most member organisations to foster collaboration. Second, the hub must determine and establish an appropriate level of formalisation, which can range from minimally formalised, organic structures to highly formalised arrangements governed by contracts, or even associative models, depending on the ecosystem's context and needs. Lastly, the hub must be able to adapt the governance and formalisation structures as the context and member relationships evolve. This adaptability ensures the ecosystem remains effective and cohesive amid changing internal and external conditions.

A hub organisation's legitimacy is another crucial capability for fulfilling its role as an orchestrator (DC4 – Gain and maintain legitimacy). This legitimacy, recognised by ecosystem members and potentially external stakeholders, is built on the hub's ability to demonstrate the adequacy of its innovation support services and its effectiveness in orchestrating the ecosystem. A lack of confidence in these areas may lead members to disengage or advocate for a more legitimate organisation to assume the hub role.

Finally, the hub must identify, mobilise, and manage both financial and human resources (DC5 – Manage resources). This includes assessing existing resources, identifying gaps, and proactively seek for new sources of financial and human resources. Resource allocation must also be handled carefully to maintain member satisfaction and prevent conflicts. Dissatisfaction

in resource distribution may lead to disputes or member exits, threatening ecosystem stability. Maintaining harmony and minimising opportunistic behaviours are thus core components of the hub organisation's orchestration meta-capability.

Table 4: Meta-capability to structure the ecosystem

DC2 – Involve	**DC3 – Establish appropriate structure**	**DC4 – Gain and maintain legitimacy**	**DC5 – Manage resources**
Capability to identify and involve relevant members in the ISSE	Capability to provide ISSE with a structure enabling it to function properly	Capability to create and assert its legitimacy among ISSE members	Capability to identify the resources needs of the ISSE, mobilise and manage them
Involve in the ISSE members that are complementary, multi-disciplinary, etc. Face entries and exits of members of the ISSE (causing losses of resources, capabilities, services, etc.)	identify and implement a governance favourable to the good functioning of the ISSE identify and implement the degree of formalisation needed for the ESSI to function properly (contract between members of the ecosystem; associative format etc). adapt the degree of hierarchy and formalisation to the context evolutions (inside the ISSE and in the environment)	communicate about its support mode for innovators Capability to communicate on its role as Hub organisation	identify the ISSE needs in capabilities and resources identify which capabilities and resources are held by each member of the ISSE identify and mobilise new partners/structures which can support the ISSE distribute any funding allocated to ISSE satisfactorily among members

Meta-capability to orchestrate

A critical group of capabilities within an Innovation Support Services Ecosystem (ISSE) focuses on enabling effective collaboration among members, termed "capabilities to orchestrate". These include managing "coopetition," facilitating interactions, fostering effective communication, and aligning organisational differences (see *Table 5*).

The ability to manage coopetition involves balancing competitive and cooperative dynamics among ecosystem members, who may compete for resources, skilled personnel, or clients (DC6 – Manage coopetition). Trust and collaboration are essential for ecosystem functionality, and mechanisms such as collective sanctions can deter opportunistic behaviours. Additionally, decision-making power must remain balanced to prevent disengagement, with the hub organisation adopting a servant leadership approach to act as an impartial facilitator rather than a dominant authority. Actors feeling that their views are undervalued may lose motivation to contribute to the ecosystem, which would be counterproductive.

Facilitating interactions (DC7 – Facilitate) involves two sub-capabilities: organising and leading effective meetings to ensure productive communication and coordinating activities by clearly defining the roles of ecosystem members. The hub does not execute all activities but ensures that each actor understands and fulfils their responsibilities.

Effective communication (DC8 – Communicate) requires developing a shared language to minimise misunderstandings. For example, in ISSEs centred on agroecology in the Global South, actors must align on the meaning of agroecology, as differing interpretations (e.g., on the use of synthetic inputs or the importance societal values versus only technical production methods) could hinder collaboration. Efficient communication channels are also crucial, especially when in-person meetings are infrequent.

Finally, the hub must align diverse organisational factors, including working habits, cultures, and operational timelines (DC9 – Align organisations). Differences in working practices can cause misunderstandings, while cultural discrepancies may lead to tensions, such as non-profits criticising private actors for prioritising profit. Alignment mechanisms can mitigate these

issues. Divergent timelines present another challenge, as short-term needs (such as incubators working with entrepreneurs on a fixed timeline, or development project actors operating within a set project duration) may conflict with long-term objectives (such as policymakers enacting legislation or researchers working on extended projects). Anticipating and addressing these differences is essential to fostering collaboration and achieving shared goals

Table 5: Meta-capability to orchestrate the ecosystem

DC6: Manage coopetition	**DC7: Facilitate**	**DC8: Communicate**	**DC9: Align organisations**
Capability to ensure a permanent balance between competition and coordination in the ISSE	Capability to facilitate interactions between members of the ISSE	Capability to develop a common language and communication modes to insure efficient communication among members	Capability to align different organisations (functioning, culture, temporalities, etc.)
Anticipate and manage competition among members Manage power balance between members Create a trusting environment and reduce opportunistic behaviours	Skills in facilitation (planning, organising, conduct efficient meetings) Find an agreement on task repartition between members	Develop common language to reduce risk of misunderstandings Implement communication mechanisms to transfer relevant information to other members of the ISSE	Get organisations with different working habits to work together Get organisations with different culture to work together Get organisations with different temporalities to work together

Meta-capability to build partnerships

A third group of capabilities relates to the ecosystem's interaction with its external environment, focusing on aligning service offerings, adapting to changes in context, and promoting the ecosystem's activities to external stakeholders. These are collectively termed the "meta-capability to build partnerships" (see *Table 6*).

The first capability involves identifying service gaps for innovators and aligning the ecosystem's offerings (DC10 – Align service offer). It encompasses three sub-capabilities. The

first is the ability to map existing services within the ecosystem and ensure their availability is well-communicated, either through formal documentation or informal knowledge-sharing among members. The second is the identification of missing services, requiring an understanding of innovators' specific needs. The third involves creating new services when necessary, requiring coordination to determine which organisations will lead the effort, thereby reducing competition or overlap. For co-created services, issues of ownership and value capture should be proactively addressed.

The second capability focuses on evolving the ecosystem to respond to contextual changes (DC11 – Anticipate and adapt to context evolution). These may include shifts in membership, objectives, or inter-actor relationships. This capability includes monitoring the institutional environment to anticipate regulatory changes, policy shifts, or the emergence of new actors, such as government services or international funders. Monitoring organisations and other ecosystems offering similar services is also crucial. Using this knowledge, the ecosystem can adjust its strategies and objectives to align with the prevailing context. The hub organisation plays a central role in initiating these discussions and facilitating necessary adaptations.

The final capability involves promoting the ecosystem and its activities to external stakeholders (DC12 – Highlight). This requires tailored communication for different audiences. For innovators, the focus is on raising awareness of the ecosystem's services, members, and activities. Potential new members need to understand the ecosystem's vision and the benefits of participation. Engagement with government actors through advocacy and lobbying can influence the innovation environment, while communication with donors can collect financial support and amplify the ecosystem's objectives. Additionally, promoting the ecosystem

involves participation in strategic events, where the hub organisation may assist in determining which member will represent the ecosystem and the key messages to convey.

Table 6: Meta-capability to build partnerships

DC10: Align service offer	**DC11: Anticipate and adapt to context evolution**	**DC12: Highlight**
Capability to identify missing services and align the service offer of the ISSE to the innovators needs	Capability to make the ecosystem evolve on its composition, services, mission and relationships among members, to respond to context evolution	Capability to highlight the ISSE to external "partners"
Identify available services among members (and transfer the information) Identify missing services for innovators Align the service offer of the ISSE to the needs of the innovators by promoting creation of missing services, reducing risks of competition on similar services	Monitor the institutions that support innovation in the country Monitor the organisations and ISSE providing similar services Adapt ISSE's internal objectives and policies to suit the political and funding context	Communicate effectively about ISSE and its activities to innovators Communicate effectively about ISSE and its activities to potential future members Communicate effectively about ISSE and its activities to potential donors and political actors (advocacy and lobbying) Identify and participate to strategic events

Meta-capability to handle knowledge

The *Knowledge handling* capability group comprises the competencies necessary for organisational and inter-organisational learning within the Innovation Support Services Ecosystem (ISSE). These include generating knowledge on supporting agricultural innovation and managing and co-learning within the ecosystem (see *Table 7*).

The first key capability is facilitating transdisciplinary reflection among ecosystem organisations to produce and update knowledge on innovation support (DC13 – Produce knowledge). As these organisations contribute to advancing agricultural innovation, they

develop skills, accumulate insights, and derive lessons from their efforts. This collective knowledge must be carefully discussed, consolidated, and shared across the ecosystem.

The second capability centres on broader knowledge management within the ecosystem, including absorbing externally generated knowledge (DC14 – Manage knowledge). Sub-capabilities include formalising knowledge, capturing lessons learned, and helping actors acquire new external insights. It also involves establishing monitoring and evaluation mechanisms that allow the ecosystem to learn from its activities and adapt as necessary.

Table 7: Meta-capability to handle knowledge

DC13: Produce knowledge	**DC14: Manage knowledge**
Capability to lead a cross-disciplinary reflection among ISSE organisations to produce and update knowledge on innovation support	Capability to manage knowledge among the ISSE and facilitate (peer-)learning
Lead a discussion on how to support innovation Share knowledge among members on innovation support	Support formalisation of knowledge and capitalisation on lessons learned Encourage the absorption of knowledge produced outside of the ISSE Carry out monitoring and evaluation and to learn from practical experience in the ecosystem

4.4. APPLICATION ON A CASE STUDY

To validate the model's representation of the hub organisation's capabilities, we compared its results (see Table 8) with the ecosystem's observed performance through two analyses. First, we examined "orphan segments" – absent services that hindered the optimal implementation of the umbrella innovation and its associated innovations. These gaps indicate missing or insufficient capabilities. Second, we analysed the lowest-rated capabilities to assess their impact on ecosystem performance.

Table 8: Notation of the dynamic capabilities in the Burkina Faso PGS case study

Dynamic capability	Notation in the case study
DC1: Envision	4,7
DC2: Involve	2,3
DC3: Establish appropriate structure	3,3
DC4: Gain and maintain legitimacy	4,0
DC5: Manage resources	3,7
DC6: Manage coopetition	2,3
DC7: Facilitate	3,5
DC8: Communicate	3,0
DC9: Align organisations	2,2
DC10: Align service offer	2,7
DC11: Anticipate and adapt to context evolution	3,7
DC12: Highlight	3,8
DC13: Produce knowledge	3,0
DC14: Manage knowledge	2,0

The first analysis identified critical missing services, such as the provision of organic inputs like seeds and fertilisers, linked to a low score for "DC10: Aligning service offer". Financing and training for the system's financial independence, particularly for certification costs, were also lacking. This issue aligns with "DC5: Resources" and "DC12: Highlighting", both of which scored relatively high, suggesting that financial independence represents a long-term rather than immediate challenge. Another gap was the absence of dynamic marketing channels to scale up the commercialisation of labelled products, reflecting a low "DC2: Involve" score, as engaging private sector actors has proven difficult. Actors who do exhibit tolerance toward the supply

chain challenges faced by farmers, tend to operate in niche markets, which struggle to scale in terms of volume.

The second analysis highlighted capabilities rated below 2.5. "DC2: Involve" was hindered by challenges in managing member turnover, which affects ecosystem resilience but not daily activities. "DC6: Coopetition" scored low due to a lack of predefined conflict resolution rules and sanctions, with conflicts managed on an ad-hoc basis. Although this approach does not present immediate difficulties, it could create challenges in the future if conflicts become more frequent or complex. "DC8: Aligning organisations" reflected the diverse cultures, practices, and timelines among members, with limited action taken to address these disparities. Finally, "DC4: Knowledge management" also received a low rating, leading to suboptimal ecosystem performance and potential long-term risks if critical knowledge holders exit.

While these weaker capabilities have not yet significantly impacted the ecosystem's strong performance, they pose long-term risks. Strengthening these areas would help formalise ecosystem operations and enhance its overall resilience and effectiveness.

5. DISCUSSION

5.1. CAPABILITIES OF THE HUB ORGANISATION OF AN AGRICULTURAL ISSE IN THE GLOBAL SOUTH: SPECIFIC OR GENERIC?

The literature on dynamic capabilities is characterised by a significant number of conceptual papers, many of which are not directly tied to a specific sector. Research within this field generally takes one of two approaches: an in-depth analysis of one or two specific capabilities or the development of a broader, encompassing model. For instance, detailed studies have focused on individual capabilities such as absorptive capacity (Cohen & Levinthal, 1990), adaptive capacity (Biedenbach & Müller, 2012), organisational learning (Nonaka & Takeuchi, 1996), reconfiguration (Hawass, 2010), and ambidexterity (Turner et al., 2017). In contrast,

other works aim to provide overarching frameworks that capture the interrelations and breadth of dynamic capabilities.

Research on dynamic capabilities has predominantly been conducted at the organisational level, and while some capabilities are transferable to the inter-organisational scale, particularly for ecosystem orchestration, others are not. This limitation creates gaps, particularly in understanding how certain organisational capabilities can be adapted for inter-organisational contexts. For example, capabilities related to aligning a value proposition with demand are widely studied at the organisational level, where they ensure competitiveness. However, applying this concept to a collective value proposition within a group of actors remains underexplored, even though it is based on similar determinants.

In this section, we have chosen to compare the capabilities outlined in our model with two categories of literature: conceptual reference articles and articles focusing on sectors that share similarities with our case studies, particularly due to their exposure to varying degrees of abrupt contextual changes (see Appendix A). These sectors include the energy sector, where transitions towards "clean energy" and the development of smart cities are prominent; the tourism sector, which demonstrates resilience in the face of shocks such as wars and the COVID-19 pandemic; and the health sector, which is undergoing a transition towards more user-centred systems.

Our model identifies equivalents for most capabilities described in the literature. However, approximately one-third of the sub-capabilities within our framework have no direct equivalents and one-third of the sub-capabilities are only partially similar to those documented in other contexts. These sub-capabilities are critical for fully understanding dynamic capabilities, as they provide granular insights into what may hinder the development of these

broader capacities. For instance, the visioning capability varies significantly between authors. For some, such as Murray et al. (2022), it involves co-creating a collective vision for the ecosystem's future. For others, it emphasises envisioning contextual changes (Nordin et al., 2018), highlighting a divergence in interpretation.

Certain capabilities within our model are particularly distinctive to our context. These include the ability to identify and involve relevant members, which is surprisingly underexplored in the literature despite its foundational importance. While one of its sub-capabilities namely the capability to face entries and exits of members of the ecosystem, is highly specific in resource-constrained settings like ours, the other sub-capabilities could be expected to be shared with other inter-organisational studies. Similarly, the capability to establish and assert legitimacy is rarely addressed, even in inter-organisational studies because few articles target explicitly the capabilities needed for fulfilling the hub organisation's role. Other unique capabilities include aligning diverse organisations, which is especially relevant in ecosystems characterised by highly heterogeneous actors (e.g., public, private, research, incubators, and time-limited development projects). Additionally, capability such as raising visibility for the ecosystem's actions among external partners is largely absent from other sectors, even where similarities might be expected, such as in tourism. Finally, the capability of fostering innovation support reflection is highly specific to ISSEs and couldn't be found in the literature.

In summary, certain capabilities in our model, such as vision, structure, coopetition, facilitation, communication, contextual adaptation, and knowledge management, are generic and found across sectors and organisational levels. In contrast, other capabilities are unique to the hub organisation's function – such as involving relevant members, establishing legitimacy, aligning diverse organisations, and raising the ecosystem's visibility – or specific to agricultural

innovation ecosystems, such as fostering reflection on innovation support. This distinction underscores the value of a tailored approach to dynamic capability assessment in different contexts.

5.2. CONTRIBUTIONS, LIMITS AND FUTURE AVENUES OF RESEARCH

This study makes significant contributions to both academic literature and practical management, offering valuable insights for scholars and practitioners involved in the orchestration of Innovation Support Service Ecosystems (ISSEs). From a scientific perspective, the study contributes a comprehensive review of capability assessment approaches. This review is relevant beyond the agricultural sector and provides a foundational reference for researchers interested in evaluating organisational capabilities in diverse contexts. Additionally, the research presents a conceptual framework for the capabilities required by hub organisations in agricultural ISSEs. This framework has been validated through empirical evidence and offers a distinction between generic capabilities, applicable across ecosystems, and context-specific capabilities that are tailored to the unique challenges of agricultural innovation. By doing so, the study advances theoretical understanding of the roles and capabilities needed for effective ecosystem orchestration.

In terms of managerial contributions, the findings offer actionable recommendations for multiple stakeholders. For hub organisations, the framework provides a tool for self-assessment, enabling them to identify gaps in their capabilities and implement targeted capability-building initiatives to enhance their effectiveness. Institutions involved in structuring ISSEs or supporting hub organisations can also benefit from the study, as it allows to identify which capabilities should be prioritised for development. This helps institutions design strategies that better support the orchestration and sustainability of innovation ecosystems.

Furthermore, the framework is highly relevant for funding agencies, offering them a means to identify organisations with the strongest potential to serve as effective hubs. By focusing their support on capability-building for these organisations, funders can ensure that their investments achieve maximum impact and efficiency.

Despite these contributions, the study is not without limitations. While the research methodology incorporated measures to ensure rigour, including an extensive literature review and expert consultations, the conclusions drawn from the capability framework are based on a single case study. Although this exploratory approach is a valuable starting point, its findings should be interpreted with caution. Future research should address this limitation by applying the framework to a larger and more diverse sample of ISSEs. A broader application, potentially using quantitative methods, would allow for the refinement of the framework or even its partial revision to better capture the dynamics of hub organisations in varying contexts.

Additionally, the study emphasises the central role of the visioning capability and its interconnections with other capabilities. However, further research is needed to explore these relationships in greater depth. Such investigations could offer a more nuanced understanding of how the absence or underdevelopment of specific capabilities affects the hub organisation's ability to fulfil its role effectively.

Finally, building on prior research (Orbell et al., 2024b) that has identified the emergence of ecosystems as a process occurring in three successive phases, future studies could focus on characterising the most critical capabilities required at each phase. This would provide insights into how capability-building efforts can be sequenced to align with the evolving needs of the ecosystem as it develops and matures.

6. CONCLUSION

This article was built upon three key observations. First, the literature provides limited guidance on constructing dynamic capability assessment models. Second, research on dynamic capabilities remains underdeveloped regarding the specific capabilities required to orchestrate service ecosystems. Third, studies focusing on dynamic capabilities in the agricultural sector within Global South contexts are particularly scarce.

From these starting points, this study addressed the following research question: What dynamic capabilities are required by a hub organisation to orchestrate a service ecosystem, and how can these capabilities be effectively evaluated? To answer this, we proposed a four-step methodology for building a dynamic capability assessment model: a comprehensive literature review, an expert workshop, application to a case study, and cross-sectoral comparison. This methodology's originality lies in its integration of scientific knowledge and practical insights, enabling an exploration of a relatively under-researched sector (agriculture) and subject (innovation support service ecosystems). The case study application validated the model's coherence on the ground, while the cross-sectoral comparison allowed us to distinguish between generic capabilities (vision, structure, coopetition, facilitation, communication, contextual adaptation, and knowledge management) and those specific to agricultural ecosystems in the Global South (involving relevant members, establishing legitimacy, aligning diverse organisations, raising the ecosystem's visibility, and fostering reflection on innovation support).

Furthermore, this article presents a dynamic capability model tailored to the hub organisations of service ecosystems dedicated to supporting agricultural innovation in the Global South. This model offers practical implications for both hub organisations and their stakeholders. For hub organisations, it provides a framework for assessing their dynamic capabilities, helping to

identify areas requiring capacity strengthening to improve their effectiveness in orchestrating the ecosystem. For support organisations and funders, it offers a tool to evaluate whether an organisation has the potential to assume the role of a hub within an innovation support service ecosystem.

By bridging theoretical and practical considerations, this study contributes to filling gaps in the literature on dynamic capabilities, particularly within the underexplored contexts of agricultural innovation and the Global South. Future research could further refine and expand the proposed model by applying it to diverse ecosystems and contexts, thereby enhancing its robustness and relevance across sectors.

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Appendix A: Comparison of the sub-capabilities from our model with the capabilities identified in the literature

	Conceptual	Energy	Tourism	Health
DC1.1. Capability to co-construct a strategic vision	NA	NA	Similar	NA
DC1.2. Capability to make the strategy available and sensitize members	NA	NA	NA	NA
DC1.3. Capability to plan the implementation of the vision	NA	NA	Similar	NA
DC2.1 Capability to involve in the ISSE members that are complementary, multi-disciplinary, etc.	NA	Present but different	NA	NA
DC2.2 Capability to face entries and exits of members of the ISSE (causing losses of resources, capabilities, services, etc.)	NA	NA	NA	NA
DC3.1 Capability to identify and implement a governance favourable to the good functioning of the ISSE	Similar	Similar	NA	NA
DC3.2. Capability to identify and implement the degree of formalisation needed for the ESSI to function properly (contract between members of the ecosystem; associative format etc).	NA	NA	NA	NA
DC3.3. Capability to adapt the degree of hierarchy and formalisation to the context evolutions (inside the ISSE and in the environment)	NA	Similar	NA	NA
DC4.1 Capability to communicate about its support mode for innovators	NA	NA	NA	NA
DC4.2. Capability to communicate on its role as Hub organisation	NA	Similar	NA	NA
DC5.1 Capability to identify the ISSE needs in capabilities and resources	NA	NA	NA	NA
DC5.2. Capability to identify which capabilities and resources are held by each member of the ISSE	Present but different	NA	NA	NA
DC5.3. Capability to identify and mobilise new partners/structures which can support the ISSE	NA	Present but different	NA	NA
DC5.4. Capability to distribute any funding allocated to ISSE satisfactorily among members	Similar	NA	NA	NA
DC6.1. Capability to anticipate and manage competition among members	Similar	NA	NA	NA
DC6.2. Capability to manage power balance between members	NA	NA	NA	NA
DC6.3. Capability to create a trusting environment and reduce opportunistic behaviours	Similar	NA	NA	NA
DC7.1. Skills in facilitation (planning, organising, conduct efficient meetings)	NA	NA	NA	NA

DC7.2. Capability to find an agreement on task repartition between members	Similar	NA	NA	NA
DC8.1. Capability to develop common language to reduce risk of misunderstandings	Similar	NA	NA	NA
CD8.2. Capability to implement communication mechanisms to transfer relevant information to other members of the ISSE	Similar	NA	NA	NA
DC9.1 Capabilities to get organisations with different working habits to work together	NA	Present but different	NA	NA
DC9.2 Capabilities to get organisations with different culture to work together	NA	Present but different	NA	NA
DC9.3. Capabilities to get organisations with different temporalities to work together	NA	NA	NA	NA
DC10.1. Capability to identify missing services for innovators	Similar	Similar	Similar	NA
DC10.2. Capability to identify available services among members (and transfer the information)	NA	Present but different	NA	NA
DC10.3. Capability to align the service offer of the ISSE to the needs of the innovators by promoting creation of missing services, reducing risks of competition on similar services	Present but different	Present but different	NA	NA
DC11.1. Capability to monitor the institutions that support innovation in the country	NA	Similar	NA	NA
DC11.2. Capability to monitor the organisations and ISSE providing similar services	NA	Similar	NA	NA
DC11.3. Capability to adapt ISSE's internal objectives and policies to suit the political and funding context	NA	Similar	NA	NA
DC12.1. Capability to communicate effectively about ISSE and its activities to innovators	NA	NA	NA	NA
DC12.2. Capability to communicate effectively about ISSE and its activities to potential future members	NA	NA	NA	NA
DC12.3. Capability to communicate effectively about ISSE and its activities to potential donors and political actors (advocacy and lobbying)	NA	Similar	NA	NA
DC12.4. Capability to identify and participate to strategic events	NA	NA	NA	NA
DC13.1. Capability to share knowledge among members on innovation support and facilitate peer-learning	NA	NA	Present but different	Present but different
DC13.2. Capability to lead a discussion on how to support innovation	NA	NA	NA	NA

DC14.1. Capability to support formalisation of knowledge and capitalisation on lessons learned	Similar	NA	Similar	NA
DC14.2. Capability to encourage the absorption of knowledge produced outside of the ISSE	Similar	Similar	Similar	NA
DC14.3. Capability to carry out monitoring and evaluation and to learn from practical experience in the ecosystem	NA	NA	Similar	Similar