

# Evaluation & Reference Report

## Assessment of the Validity of Scaling Readiness Theory of Change in the Design, Implementation and Monitoring of Scaling Strategies in Two CGIAR-RTB Funded Scaling Projects

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# Table of Contents

Acronyms and abbreviations	iii
Glossary	iv
Executive summary	vi
Background	9
Introduction to the case studies and the broader evaluation	9
Objective of the evaluation	9
Methodological framework	11
Conceptualization	11
Operationalization	14
Collection of empirical data	16
Causal analysis	16
Results	18
EQ1. How and to what extent did SR improve the scaling performance of the two RTB Scaling Fund projects evaluated?	18
EQ1.1 To what extent were the causal mechanisms in the Scaling Readiness theory of change present and function as hypothesized?	18
Cassava flash dryer case	18
OFSP Puree case	27
EQ1.2. How and to what extent did Scaling Readiness influence the design, implementation and monitoring of scaling strategies in the two projects?	34
Cassava flash dryer case	34
Design of scaling strategies	34
Implementation of scaling decisions and reflexive monitoring	37
OFSP Puree case	38
Design of scaling strategies	38
Implementation and Monitoring	40
EQ1.3. How and to what extent does Scaling Readiness contribute to improved innovation readiness and innovation use of innovation packages of the scaling projects?	41
Cassava flash dryer case	41
OFSP Puree case	41
EQ1.4. How and to what extent does Scaling Readiness contribute to stronger coalitions for change in innovation networks?	41
Cassava flash dryer case	42
OFSP Puree case	42
EQ2. Based on the above findings, what adaptations can be made to the Scaling Readiness theory of change and its implementation?	44
Scaling Readiness theory of change	44
Scaling Readiness implementation	50
Annexes	51

## Acronyms and abbreviations

CIAT	International Center for Tropical Agriculture
CIP	International Potato Center
CIRAD	Centre de coopération internationale en recherche agronomique pour le développement
CGIAR	Consultative Group for International Agricultural Research
CRP-RTB	CGIAR Research Program on Roots, Tubers and Banana
DRC	Democratic Republic of Congo
HAC	Hypothesized Activity
HAO	Hypothesized Activity Outcome
HCM	Hypothesized Causal Mechanism
IITA	International Institute for Tropical Agriculture
MCM	Manifested Causal Mechanism
OFSP	Orange-fleshed sweet potato
R4D	Research for Development

## Glossary

### **Activity**

A Scaling Readiness information-generating activity that is assumed to influence Activity-outcome

### **Activity-outcome**

A follow-up decision, practice or change in scaling performance resulting from Scaling Readiness information-generating activity

### **Bottleneck innovations**

The core or complementary innovations in an innovation package with the low(est) innovation readiness and innovation use

### **Complementary innovations**

Innovations that are necessary to scale core innovations. They often relate to the broader environment and are geared toward making this environment more enabling, thereby allowing the core innovation to have impact at scale.

### **Core Innovations**

Innovations that are the focus of the intervention or projects that are aiming for scaling

### **Causal mechanism**

A set of an Activity, an Activity-outcome and a Mechanism/s that provides a plausible explanation as to how an activity effect or gives rise to an outcome

### **Evidence-based scaling strategy**

Scaling Readiness facilitated strategy to the scaling of an innovation in a specific context.

### **Mechanism/s**

Intervening factors (information, perception, actions, events, contexts etc.) that explain how an Activity leads or have led to an Activity-outcome in a specific causal mechanism, or how an Activity-outcome in one causal mechanism lead or have led to an Activity in another causal mechanism

### **Improved scaling performance**

Improvement in innovation use, innovation readiness, stakeholder coalitions for change and scaling resource use efficiency, including the ability to make tough decisions of shifting, postponing or stopping scaling intervention

### **Innovation**

New, improved or adapted outputs or groups of outputs such as products, technologies, services, organizational and institutional arrangements with high potential to contribute to positive impacts when used at scale

### **Innovation package**

Combinations of interrelated innovations and enabling conditions that, together, can lead to transformation and impact at scale in the CGIAR research delivery hierarchy. They are context, outcome, and use-group specific and their ability to contribute to outcomes and impact can change over time

### **Innovation readiness**

A metric used to assess the maturity of an innovation, with a scale ranging from the idea (lowest level) to validated under uncontrolled conditions (highest level)

**Innovation use**

A metric used to assess the extent to which an innovation is already being used, by which type of users and under which conditions, with a scale ranging from no use (lowest level) to common use (highest level)

**Intervention team**

Intervention managers and other people who are employed by, and contribute to, the scaling intervention

**Implementing partners**

People who provide intervention resources, and take or grant responsibility to organize and implement interventions or other activities

**Reflexive monitoring**

Formal and informal gathering and analysis of information relevant to drawing lessons about progress and/or the need to adapt the scaling strategy or the scaling action plan

**Scaling activity plan**

An activity plan that provides the actions, responsibilities, timelines, and/or resources allocated to implement the scaling strategy

**Scaling context**

The environment or geographical location in which the scaling of an innovation is intended to contribute to achieving specific livelihood outcomes or impacts

**Scaling projects**

The scaling fund projects on Cassava Flash Dryer and OFSP (Orange-fleshed sweetpotato) Puree that are used as case studies for the evaluation

**Scaling Readiness**

An evidence-based approach to support the design, implementation and monitoring of strategies to increase readiness and use of innovations at innovation package and/or portfolio level

**scaling readiness**

Metric that combines single or average innovation readiness and innovation use scores at innovation package or portfolio level

**Scaling Readiness theory of change**

A comprehensive conceptual illustration and description of how Scaling Readiness catalyzes change in the scaling decisions and scaling performance of scaling projects

**Scaling strategy**

A set of activities, implementing partner and stakeholder engagement models to overcome one or more scaling bottlenecks

**Stakeholders**

Actors in a particular intervention location or context that have vested interests or are directly or indirectly involved in the development, promotion and/or use of the innovation at hand

**Stakeholder profile**

Description of the stakeholders, their networks, and their interventions

## Executive summary

**Background and context:** Between early 2019 and end of 2020 two CGIAR-RTB funded scaling projects employed the Scaling Readiness approach to guide their overall scaling activities and decisions. *Scaling approach for flash drying of cassava starch and flour at small scale* is a two-year scaling project that aimed at improving cassava processing at small-scale through gains in energy efficiency and reduced production costs. The objective was to expand the use of cassava as a source of income and as food for low-income producers, processors and consumers in Nigeria, Colombia and DRC. *Orange Fleshed Sweetpotato (OFSP) Puree for Safe and Nutritious Food Products and Economic Opportunities for Women and Youths* is another two-year scaling project that aimed to increase the utilization of OFSP puree in fried and baked products in Kenya, Uganda and Malawi. The Scaling Readiness approach informed the development, implementation and monitoring of scaling strategies of the two projects towards their respective intervention objectives. The approach was envisaged to provide an overall decision support by encouraging critical reflection on the readiness of innovations and the actions needed to facilitate the scaling of innovations. As such, the two scaling projects served as case contexts to evaluate the level of validity of the theoretical assumptions behind the SR approach and its contribution to the overall scaling performance of the projects.

**Objective of the evaluation:** 1) Improve understanding on what is working and not, in particular relating to progress along the Scaling Readiness theory of change, 2) Generate insights on the contribution of Scaling Readiness to scaling decisions and outcomes in two case studies; and, 3) Synthesize lessons and recommendations useful to further develop and refine the Scaling Readiness approach.

The main evaluation questions are:

EQ1. How and to what extent did SR improve the scaling performance of the two RTB Scaling Fund projects evaluated?

EQ2. Based on the above findings, what adaptations can be made to the Scaling Readiness theory of change and its implementation?

**Methodological approach:** Six overarching causal mechanisms as building blocks of the Scaling Readiness theory of change were put forward for validity test.

1. *Hypothesized causal mechanism 1:* 'Capacity development within scaling interventions' will lead to 'higher willingness to invest time and resources in developing, implementing and monitoring evidence-based scaling strategies', through 'a better understanding of the key principles and concepts underlying scaling of innovation'
2. *Hypothesized causal mechanism 2:* 'Context-specific innovation packages and the assessment of their scaling readiness', will facilitate 'the prioritization of bottleneck innovations', through 'a greater awareness of interdependencies between core and complementary innovations and their current innovation readiness and use to achieve societal outcomes'
3. *Hypothesized causal mechanism 3:* 'The systematic exploration of strategic options to overcome bottleneck innovations by the intervention team', will result in 'better/different decisions regarding proposed investments and actions as part of a draft scaling strategy', through 'a greater/novel awareness of available options for enhancing the scaling readiness of the

innovation packages that are realistic within limitations of the scaling intervention (available time, resources)’

4. *Hypothesized causal mechanism 4*: ‘Stakeholder profiling and stakeholder network analysis’, will lead to ‘better/different decisions regarding selection of partners to overcome the innovation bottlenecks’, through ‘a greater/novel awareness of gaps in the competencies that are required for scaling’
5. *Hypothesized causal mechanism 5*: ‘The development, presentation and facilitated discussion of a systematically underpinned draft scaling strategy’, will lead to ‘an agreed-upon scaling strategy and scaling action plan that is supported by relevant stakeholders’, through ‘a better understanding of the scaling strategy building blocks and a greater motivation to collaborate towards overlapping objectives’
6. *Hypothesized causal mechanism 6*: ‘The reflexive monitoring of the implementation of the agreed-upon scaling strategy and scaling action plan’ (HAC6), will lead to ‘improved scaling performance’ (HAO6), through ‘overcoming bottleneck innovations and greater enthusiasm, energy and synergy in the partnership’

The next stage was operationalizing through translating the components of the hypothesized causal mechanisms into indicators that set judgment criteria for the level of presence or absence of the causal assumptions in the actual cases. A key outcome in the change theory, ‘Improved scaling performance’, is understood as improvements in the scaling readiness (innovation use, innovation readiness) of context-specific innovations and stakeholder coalitions for change. It was also interpreted as improved adaptive capacity, scaling resource use efficiency and the ability to make (tough) decisions (e.g., postponing or stopping the intervention) as a result of using Scaling Readiness. Based on empirical evidence collected through in-depth interviews and document reviews, a process tracing approach was used to unpack how scaling decision processes (Manifested causal mechanisms) unfolded in the case studies, and to assess whether and how the manifested causal mechanisms in the cases match with the hypothesized causal mechanisms.

### **Key findings (EQ1) and conclusions (EQ2)**

*Hypothesized causal mechanism 1*: In the Cassava Flash Dryer case, capacity development around concepts and principles of scaling of innovations catalysed positive change in scaling investments and practices. This was done through significant modification of the original scaling plan based on broader system characterization. Conversely, a perceived need to respond to existing (institutionalized) practices and associated accountability and/or incentive systems was also found to negatively affect willingness to invest time and resources in developing, implementing or monitoring a new scaling strategy. The mechanism required to effectively stimulate increased willingness to invest time and resources for evidence-based scaling strategies goes beyond change in knowledge within the intervention team and calls for a gradual change in expectations in the broader system that interventions operate in. Moreover, evidence from the OFSP Puree case showed how capacity development may not always lead to the type of understanding or change in knowledge it envisages to nurture. ‘*Understanding the key principles and concepts underlying scaling of innovation*’ entails a process of gradual shift in view on innovation and change processes. In this regard, explicating the Scaling Readiness perspective on *capacity development* and perhaps exploring ways for further facilitation of action-oriented type of learning processes could

help support continuous development of capacity that can address the divide in understanding between the assumed and the observed.

*Hypothesized causal mechanism 2:* The redefinition of context-specific innovation packages and the assessment of their scaling readiness in the Cassava flash Dryer case has generated new insight on system transformative innovation components and the identification of context-specific bottleneck innovations. With the OFSP case, pre-established partnerships limited prospects of strategic investment around potential bottleneck innovations. In contexts where there are existing working ties or partnership trajectories that transcend the timeframe of scaling projects, early joint reflection among the intervention team and key stakeholders on the value of bottleneck prioritization and its implication to scaling investment and partnership formation is imperative.

*Hypothesized causal mechanism 3:* In the Cassava Flash Dryer case, exploration of options to overcome the bottlenecks has informed key strategic scaling decisions to pull out resources from scaling contexts that could have compromised the scaling efforts of the intervention. An important divergence in Nigeria, Colombia and Dominican Republic is the shift in investment to just the technology due to emerging resource dilemma of continuing to invest in system transformative activities that might delay attributable outcomes within the project timeframe. However, such eventual departure has more to do with the timing of implementation of the Scaling Readiness activities in a relatively short project than the theoretical assumption that already highlighted the importance of a realistic assessment of strategic options within the resource limitations of a scaling intervention. Early implementation of the different Scaling Readiness activities (e.g., characterization, diagnosis) can support flexibility within interventions to better manage the emergent nature of scaling practices and to strike a balance between short-term gains and long-term scaling investments.

*Hypothesized causal mechanism 4:* Existing partnership ties was found to have a significant influence in scaling decisions and associated partners' selection in OFSP Puree case. Even though the stakeholder profiling and network analysis had some contribution in the selection of partners, there was a marked tendency to dwell on existing partnerships. Given the likely strong influence of broader partnership trajectories on scaling decisions, it would be imperative for the Scaling Readiness approach to further support scaling interventions to reflect on the potential (positive or negative) implications of partnership path dependencies as part of the design process of scaling strategies. This could create the opportunity for scaling interventions to leverage on some path dependencies or break away from others.

*Hypothesized casual mechanism 5:* The evidence from the OFSP Puree case provides support to the fitness of the hypothesized casual mechanism whereby a rigorous deliberation among broader stakeholders facilitated agreements on the draft scaling workplan. The digress in scaling decision trajectory to the Flash Dryer technology component in Nigeria, Colombia and Dominican Republic had a chain effect that limited deliberation and negotiation processes with few Cassava Flash Dryer developers and users rather than broader system actors as anticipated in the change theory.

*Hypothesized casual mechanism 6:* The Cassava Flash Dryer case in DRC lends support to the theoretical causal mechanism by demonstrating how reflexive type of monitoring and learning around the implementation of planned activities can lead to improved scaling performance. The *innovation readiness* of some of the identified bottlenecks has shown improvement by the end of the project.



## Background

### Introduction to the case studies and the broader evaluation

*Scaling approach for flash drying of cassava starch and flour at small scale* is a two-year scaling project that aimed to improve cassava processing at small-scale through gains in energy efficiency and reduced production costs. The objective was to expand the use of cassava as a source of income and as food for low-income producers, processors and consumers in Nigeria, Colombia and DRC. The project builds on previous RTB work of developing a small-scale, cost-effective flash dryer for processing high-quality cassava flour that started with computer-based simulation and progressed to the design, manufacturing and validation of a Cassava Flash Dryer prototype.

*Orange Fleshed Sweetpotato (OFSP) Puree for Safe and Nutritious Food Products and Economic Opportunities for Women and Youths* is another two-year scaling project designed with the objective of increasing the utilization of OFSP puree in fried and baked products in Kenya, Uganda and Malawi. The project aimed to promote the use of OFSP Puree as a substitute for wheat flour and to improve the nutrient content of baked and fried products. These would help improve the income of smallholder farmers by opening formal and informal markets for OFSP roots.

Both projects implemented the Scaling Readiness approach to inform the development, implementation and monitoring of their scaling strategies towards their respective project objectives. The Scaling Readiness approach can support research for development (R4D) organizations, projects, and programs in achieving their ambitions to scale innovations and achieve impact. In addition to providing decision support in a management sense, it is expected to encourage critical reflection on how ready innovations are for scaling, and what appropriate actions could accelerate or enhance the scaling of innovations. In this regard, the two scaling projects served as case contexts to evaluate the level of validity of the assumptions behind the SR approach and its contribution to the overall scaling performance of the projects.

### Objective of the evaluation

The objective is to carry out a systematic evaluation of the validity of the Scaling Readiness Theory of Change and the associated casual assumptions around the adaptive management and assessment of scaling decisions and outcomes. On one hand, it investigates whether and how the cases implemented Scaling Readiness in light of the implementation steps and theory of change, and on the other hand, it assesses the way and the extent Scaling Readiness informed scaling decisions and outcomes in the selected cases. To this end, the evaluation is envisaged to meet three main objectives; 1) Improve understanding on what is working and not, in particular relating to progress along the Scaling Readiness theory of change, 2) Generate insights on the contribution of Scaling Readiness to scaling decisions and outcomes in two case studies; and, 3) Synthesize lessons and recommendations useful to further develop and refine the Scaling Readiness approach. To this end, the following evaluation questions are tackled:

EQ1. How and to what extent did SR improve the scaling performance of the two RTB Scaling Fund projects evaluated?

- EQ1.1. To what extent were the causal mechanisms in the Scaling Readiness theory of change present and function as hypothesized?
- EQ1.2. How and to what extent did Scaling Readiness influence the design, implementation and monitoring of scaling strategies in the two projects?
- EQ1.3. How and to what extent did Scaling Readiness contribute to improve innovation readiness and innovation use of innovation packages of the scaling projects?
- EQ1.4. How and to what extent did Scaling Readiness contribute to stronger coalitions for change in innovation networks?

EQ2. Based on the above findings, what adaptations can be made to the Scaling Readiness theory of change and its implementation?

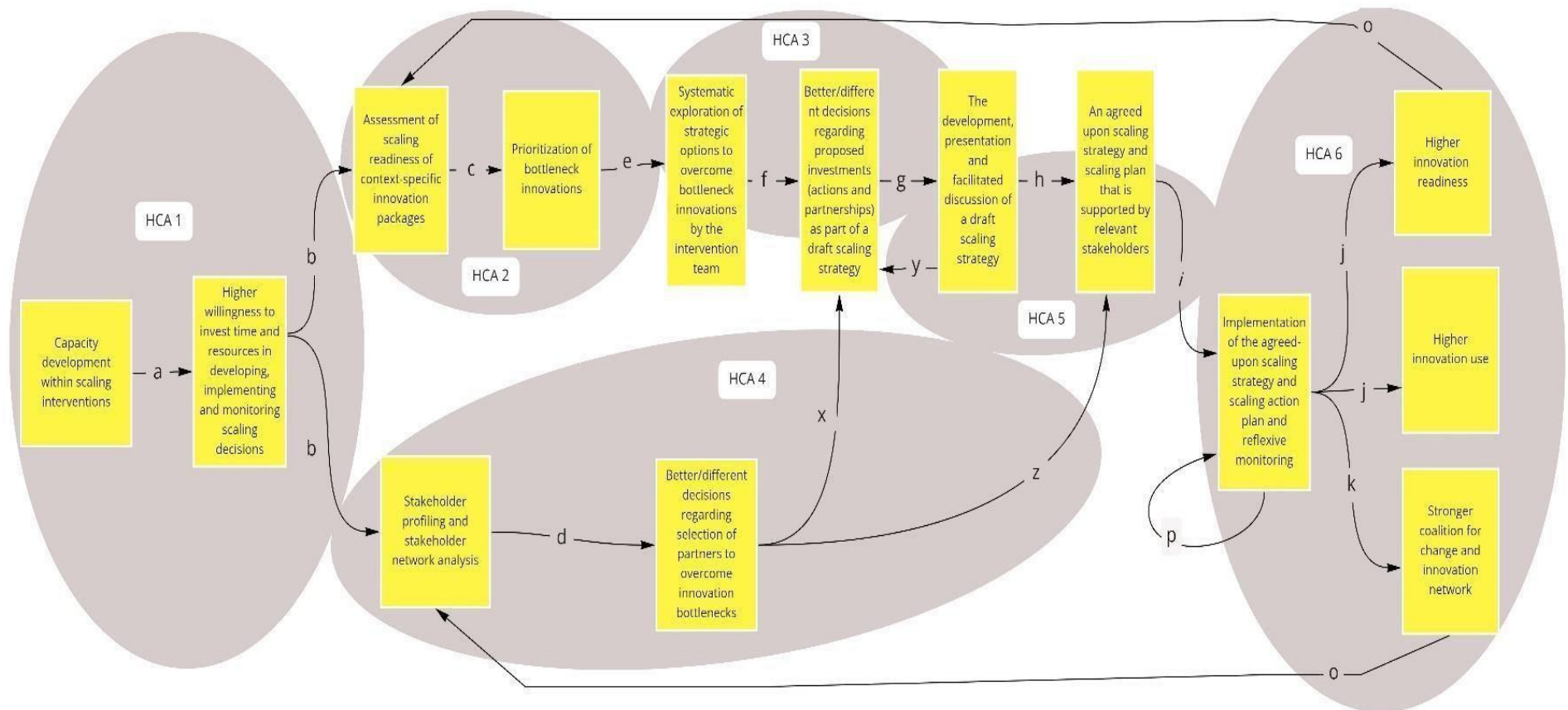
## Methodological framework

The Scaling Readiness theory of change foresees a causal process through which the approach is anticipated to influence scaling decisions and outcomes of scaling projects. The hypothesized causal processes of the theory served as a conceptual lens and guided the methodological framework development for the evaluation.

### Conceptualization

Six overarching causal mechanisms as building blocks of the Scaling Readiness theory of change were posited for validity test. The hypothesized causal mechanisms (HCM) are specified in testable propositions whereby each causal mechanism has a Hypothesized Activity (HAC), a Hypothesized Activity Outcome (HAO) and a Hypothesized Mechanism (a, b, c etc.) as its subcomponents. The assumption is that a particular scaling readiness activity generates information that will influence a scaling decision through a mechanism. This, in a causal chain of interaction, is expected to contribute to improved scaling performance. Central to the contribution of the Scaling Readiness approach, 'Improved scaling performance' is interpreted as improvements in the scaling readiness (innovation use, innovation readiness) of context-specific innovations and stakeholder coalitions for change. It also means improved adaptive capacity, scaling resource use efficiency and the ability to make (tough) decisions (e.g., postponing or stopping the intervention) as a result of using Scaling Readiness.

**Figure 1: Scaling Readiness theory of change**



## Mechanisms:

- a. A better understanding of the key principles and concepts underlying scaling of innovation
- b. A stronger commitment to invest resources in characterizing scaling intervention, scaling context, innovation packages and stakeholder networks
- c. A greater awareness of interdependencies between core and complementary innovations and their current innovation readiness and innovation use to achieve societal outcome in a specific context
- d. A greater/ novel awareness of stakeholder capacities, clusters and mandates
- e. A greater awareness of the context- and objective-specific bottlenecks for scaling and that these need to be addressed
- f. A greater/novel awareness of available strategic options (Substitute, Outsource, Relocate etc.) for overcoming bottlenecks for scaling that are realistic within limitations of the scaling intervention (available time, resources)
- g. Awareness on the tools and facilitation techniques of/for Scaling Readiness?
- h. A better understanding of the scaling strategy building blocks and a greater motivation to collaborate towards overlapping objectives
- i. Allocation of required resources, time and collaboration as per agreements and action plans
- j. Overcoming bottlenecks
- k. Greater enthusiasm, energy and synergy in the partnership
- x. Informed decisions on which actors or partner organizations are best positioned to overcome bottlenecks for scaling
- y. Stakeholder feedback on the feasibility and desirability of the draft scaling strategy to refining the scaling strategy (may require exploring alternative strategic options)
- z. Better understanding of strategic stakeholders that had not been engaged in the scaling process
- o. New (long) loop of Scaling Readiness assessment starting in Step 1, looking again at (changes in innovation readiness and innovation use of context-specific innovation packages and (changes) in stakeholder coalitions and networks
- p. Short loop monitoring, evaluation and learning during implementation of scaling action plan

## Operationalization

The operationalization stage of our approach translated the components of the hypothesized causal mechanisms into indicators. The indicators predict the actual presence of an Activity (*e.g. Scaling Readiness assessment*,) and an Activity outcome (*e.g. bottleneck prioritization*), together with the existence of observable manifestations (*e.g. awareness, motivation*) that relate with the mechanisms.

Table 1: Research questions linked with hypothesized causal mechanisms and indicators for the different elements of the causal mechanisms

<b>EQ1. How and to what extent did SR improve the scaling performance of the two RTB Scaling Fund projects evaluated?</b>	
<ul style="list-style-type: none"> <li>▪ EQ1.1. To what extent were the causal mechanisms in the Scaling Readiness theory of change present and function as hypothesized? <ul style="list-style-type: none"> <li>○ <i>A validity assessment that covers HCM1 to HCM6</i></li> </ul> </li> <li>▪ EQ1.2. How and to what extent did Scaling Readiness influence the design, implementation and monitoring of scaling strategies in the two projects? <ul style="list-style-type: none"> <li>○ <i>Answered with the information generated from the validity assessment of HCM1 to HCM5 (design) and HCM6 (implementation &amp; monitoring)</i></li> </ul> </li> <li>▪ EQ1.3. How and to what extent did Scaling Readiness contribute to improve innovation readiness and innovation use of innovation packages of the scaling projects? <ul style="list-style-type: none"> <li>○ <i>Answered mainly with the information generated from the validity assessment of HCM 2 and HCM6</i></li> </ul> </li> <li>▪ EQ1.4. How and to what extent did Scaling Readiness contribute to stronger coalitions for change in innovation networks? <ul style="list-style-type: none"> <li>○ <i>Answered with the information generated from the validity assessment of HCM4, HCM5 and HCM6</i></li> </ul> </li> </ul>	
<b>Hypothesized Causal mechanisms (HCMs)</b>	<b>Indicators</b>
<i>HCM 1: 'Capacity development within scaling interventions (HAC1)' will lead to 'higher willingness to invest time and resources in developing, implementing and monitoring evidence-based scaling strategies' (HAO1), through 'a better understanding of the key principles and concepts underlying scaling of innovation' (a)</i>	That the intervention team participated in and/or undertook activities that are expected to build their capacity on concepts and principles of scaling of innovation and Scaling Readiness
	That the intervention team devoted (in practice) the required time and resources at the different stages of the development, implementation and monitoring of a scaling strategy
	That there is evidence for (new) insights on (systemic) concepts and principles of scaling of innovation and scaling readiness relevant for developing, implementing and monitoring a scaling strategy
<i>HCM 2: 'Context-specific innovation packages and the assessment of their scaling readiness' (HAC2), will facilitate 'the prioritization of bottleneck innovations' (HAO2), through 'a greater awareness of interdependencies between core and complementary innovations and their current innovation readiness and use to achieve societal outcomes' (c)</i>	Innovation profiling is made for each location/context where the intervention has activities, and their scaling readiness is assessed
	That the scaling intervention definition has changed/evolved and key scaling bottleneck/s are identified and prioritized based on the generated information
	That the intervention team appreciates and/or explains the value of redefining the intervention as a package and the prioritization of bottlenecks to the scaling of core innovation
<i>HCM 3: 'The systematic exploration of strategic options to overcome bottleneck innovations by the intervention team' (HAC3), will result in 'better/different decisions regarding proposed investments and actions as part of a draft scaling strategy' (HAO3), through 'a greater/novel awareness of available options for enhancing the scaling readiness of the innovation packages that are realistic within limitations of the scaling intervention (available time, resources)' (f)</i>	That strategic options to overcome the bottlenecks are explored for each innovation package that is relevant for the development of a draft Scaling Strategy/action plan
	The exploration of options informed new scaling strategy or action plan that changed/modified the original scaling plan
	That the intervention team provides a realistic assessment of the feasibility of the new scaling strategy within the resource limitations of the scaling intervention

<p><i>HCM 4:</i> ‘Stakeholder profiling and stakeholder network analysis’ (HAC4), will lead to ‘better/different decisions regarding selection of partners to overcome the innovation bottlenecks’ (HAO4), through ‘a greater/novel awareness of gaps in the competencies that are required for scaling’ (d)</p>	<p>That a stakeholder profiling and network analysis is conducted and identified potential partners to overcome the scaling bottlenecks as part of a draft scaling strategy</p>
	<p>A decision about partners (and partnership models) to overcome the bottleneck/s was made based on information from stakeholder profiling and network analysis</p>
	<p>That there is evidence for new/different insights on the stakeholder context and specific stakeholders’ capacity to help address the bottlenecks</p>
<p><i>HCM 5:</i> ‘The development, presentation and facilitated discussion of a systematically underpinned draft scaling strategy’ (HAC5), will lead to ‘an agreed-upon scaling strategy and scaling action plan that is supported by relevant stakeholders’ (HAO5), through ‘a better understanding of the scaling strategy building blocks and a greater motivation to collaborate towards overlapping objectives’ (h)</p>	<p>That a draft scaling strategy is developed and discussed with broader stakeholders</p>
	<p>Agreement is reached on the implementation of draft Scaling Strategy (activities and partnerships) between intervention team and implementing partners</p>
	<p>That there is evidence for deliberation and negotiation processes among intervention team, partners and stakeholders on the content of planned scaling activities and the proposed partnership models; intervention team and intervention partners are aware of the building blocks of the scaling strategy</p>
<p><i>HCM 6:</i> The reflexive monitoring of the implementation of the agreed-upon scaling strategy and scaling action plan’ (HAC6), will lead to ‘improved scaling performance’ (HAO6), through ‘overcoming bottleneck innovations and greater enthusiasm, energy and synergy in the partnership’ (j &amp; k)</p>	<p>That there is a process of reflection and learning around the implementation of the scaling action plan</p>
	<p>That there is evidence for improved scaling performance (improved innovation readiness, innovation use, stakeholder coalition &amp; efficiency in scaling investments)</p>
	<p>That there is evidence for (adaptive) decision making during the reflexive monitoring processes (improved innovation readiness &amp; innovation use), and/or changing stakeholder configuration and partnerships during the implementation of the intervention (improved stakeholder Coalition)</p>

## Collection of empirical data

Our evaluation relied heavily on data from written sources and from in-depth interviews. Data from written sources included documents produced by the cases at the different stages of implementation of the Scaling Readiness approach. These includes scaling fund proposals, capacity building workshop reports, Intervention characterization documents, Scaling Readiness diagnosis survey reports, stakeholder engagement plans, Scaling strategy and/or activity plan documents, quarterly and annual project reports. Interview data came from 16 iterative in-depth interviews with 12 respondents that were intervention managers, scaling monitors, scaling champions and implementing partners. For the interviews, a set of structured and unstructured questions and discussion points that corresponded with the different components of the causal mechanisms or indicators were used. The documents were data sources for both ‘trace’ and ‘account’ evidence for assessing the level of presence or absence of the indicators in the cases. The trace evidence was evidencing whose mere existence (e.g. partnership agreement document) provides proof for the presence of an indicator or part of a causal mechanism. The account evidence was about information content from the interviews that may require further verification when possible or may not be verified (e.g. interviewees saying stakeholder agreement was reached). As a result, particular attention was given to available written sources and documents. More detailed information linking the causal assumptions, indicators, data source and interview questions can be found in the methodology [spreadsheet](#).




## Causal analysis

A process tracing approach was employed to unpack how scaling decision processes and outcomes unfolded in the case studies, and to assess whether and how the causal mechanisms manifested in the cases match with hypothesized causal mechanisms. Each component of the hypothesized causal mechanisms (HAC, HAO & mechanism a, b, c...) was treated as a unit of analysis or a ‘causal-process observation’ (CPO). The first causal process observation was about data concerning the hypothesized activity (HAC); the second causal-process observation was about data on the level of presence of the hypothesized outcome (HAO); and the third causal-process observation was about data concerning the level of presence of hypothesized mechanisms.

As a first stage of causal analysis, we developed a timeline on the sequence of events, activities and/or decisions from available project documents to unpack the different activities and outcomes occurring in each of the case projects. Once we have a chronological sequence of activities and outcomes, a further analysis of the data (interviews and documents) was done to produce substantive content on how the Activities and Outcomes in the cases unfolded and with what plausible mechanism/s in play. In this regard, we followed a forward-backward tracing approach whereby the data content was analyzed for evidence on the likely intermediary processes (e.g. changed knowledge/awareness, intervening contextual factors) during and following Scaling Readiness related activities. A backward tracing from outcomes was used to claim plausible mechanisms that were in play between activities and outcomes. This process of causal inference produced the “*Manifested causal mechanisms*” in each case as the case projects navigate through the process of designing, implementing and monitoring their respective scaling strategies.



At the next analysis stage, consistency between the “*Hypothesized causal mechanisms*” and the “*Manifested causal mechanisms*” was assessed as a way of ascertaining the level of fitness or validity of the causal mechanisms hypothesized. While observed similarities in causal patterns between the expected and the observed were used to reflect on the validity of the theory (*Evaluation question 1.1*), observed inconsistencies were leveraged to reflect on potential modifications that might be required to the hypothesized causal mechanisms and the overall theory of change (*Evaluation question 2*). For analytical purpose, three levels were used for the validity of a hypothesized causal mechanism is categorized into three levels depending on the level of presence or absence of the different components of a causal mechanism. But in essence the causal mechanism/s is a continuum of interrelated activities, mechanisms and outcomes whereby its components should not be seen as a stand-alone and independently meaningful entities. Three different coloured arrows (Green, Orange and Red), representing three different levels of validity, were used in the result section as we juxtaposed the hypothesized causal mechanism with the manifested casual mechanisms in each case.

-  When all of the components of a hypothesized causal mechanism are manifested in the actual case.
-  When there is a presence of the ‘Activity’ component of the hypothesized causal mechanism (Scaling Readiness activity that should inform decision) but the ‘Activity outcome’ or ‘Mechanism’ is not fully observed in the actual case and there is alternative explanation for the partial observability.
-  When the Activity component of the hypothesized causal mechanism is missing which is translated as implementation failure.

The substantive information captured in the process of identifying causal patterns in the cases and deciphering observed consistencies, or lack thereof, between the expected and observed causal mechanisms was used to address *Evaluation questions 1.2, 1.3 and 1.4*.

- *Evaluation questions 1.2:* Different themes were teased out where scaling readiness was proved to influence practices around the *design, implementation and monitoring* of scaling strategies of the interventions.
- *Evaluation questions 1.3:* addressed mainly from information generated around hypothesized causal assumption 2 (*bottleneck prioritization*) and hypothesized causal mechanism 6 (*improvement in scaling performance*)
- *Evaluation questions 1.4:* addressed with a particular focus on substantive information generated around hypothesized causal mechanism 4 (partner selection), hypothesized causal mechanism 5 (*joint appraisal of scaling strategies*) and hypothesized causal mechanism 4 (*improvement in scaling performance*)

## Results

### EQ1. How and to what extent did SR improve the scaling performance of the two RTB Scaling Fund projects evaluated?

#### EQ1.1 To what extent were the causal mechanisms in the Scaling Readiness theory of change present and function as hypothesized?

Under this sub-question, we use the three components of the hypothesized causal mechanisms as a scaffolding first to unpack how the empirically manifested causal mechanisms unfolded in the case studies and then use the empirical evidence to make claims on the level of validity of the hypothesized causal mechanisms.

#### Cassava flash dryer case

**Hypothesized causal mechanism 1:** ‘Capacity development within scaling interventions (HAC1)’ will lead to ‘higher willingness to invest time and resources in developing, implementing and monitoring evidence-based scaling strategies’ (HAO1), through ‘a better understanding of the key principles and concepts underlying scaling of innovation’ (a)

#### Finding 1:

*Capacity development within scaling interventions:* The intervention team was first exposed to the Scaling Readiness approach and underpinning concepts and principles during the scaling fund proposal development process<sup>1</sup>. After the project launch, seminars on ‘Scaling of Innovations’ and the Scaling Readiness approach were organized that shaped subsequent scaling practices<sup>2</sup>.

*More willingness to invest time and resources in developing, implementing and monitoring evidence-based scaling strategies:* The project invested its time and resources to redefine its scaling intervention as ‘bundles of innovations’ that eventually guide the design of new scaling strategies for the different intervention locations<sup>3</sup>. The intervention team pointed out that the new scaling approach came at a good time when they were looking for ways to support the scaling of the Flash Dryer technology which went through a few years of technological experimentation<sup>4</sup>. The scaling strategies have been implemented and monitored to different degrees at the different intervention locations<sup>5</sup>.

*Through a better understanding of key principles and concepts underlying scaling of innovation:* Interviews and document reviews demonstrate that there is a novel appreciation of important concepts in Scaling of Innovations (e.g. investment in key scaling bottlenecks, contextual approach to scaling, reflexive monitoring). A key member of the intervention team elaborated on how the new perspective to ‘scaling

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<sup>1</sup> Respondent 2

<sup>2</sup> 2019 project annual report

<sup>3</sup> 2019 & 2020 project annual reports

<sup>4</sup> Respondent 2

<sup>5</sup> Respondent 1&2

of innovations' is different from what he knows about 'technology transfer' highlighting the crucial role of the enabling environment for the scaling of technologies<sup>6</sup>.

#### Conclusion 1:

As assumed in the *Hypothesized causal mechanism 1*, the empirical evidence provides support that capacity development activities have indeed catalysed learning around relevant concepts on scaling of innovations and the scaling readiness approach. These concepts informed subsequent activities relevant for the development of evidence-based scaling strategies.

*Manifested causal mechanism 1*: "Capacity development within scaling interventions", led to "Higher willingness to invest time and resources in the development, implementation and monitoring of evidence-based scaling strategies", through "better understanding of key concepts and principles of scaling of innovations"

***Hypothesized causal mechanism 2***: 'Context-specific innovation packages and the assessment of their scaling readiness' (HAC2), will facilitate 'the prioritization of bottleneck innovations' (HAO2), through 'a greater awareness of interdependencies between core and complementary innovations and their current innovation readiness and use to achieve societal outcomes' (c)

#### Finding 2:

*Context-specific innovation packages and the assessment of their scaling readiness*: With the follow-up Scaling Readiness innovation profiling, 16 potential intervention areas/complementary innovations/around the core intervention (*Efficient Small Scale Flash Dryer Design for Cassava Starch and Flour*) were identified<sup>7</sup>. Only 5 innovation components were put forward as potential intervention areas in the project proposal<sup>8</sup>. The profiling also later informed the inclusion of 2 additional context-specific complementary innovations: Cassava flour market related issues in Nigeria and Colombia, and Flash Dryer Blower problem in Nigeria and DRC. A Scaling Readiness assessment was also made for the complementary innovations that are bundled as a package.

*Prioritization of bottleneck innovations*: The assessment of the degree of use and level of readiness of the complementary innovations identified 3 key scaling bottlenecks specific to the 3 intervention locations. While the key bottlenecks identified in DRC were technological, the bottlenecks in Colombia and Nigeria have additional and market-related frame conditions that relate with demand-side problems (Colombia)<sup>9</sup> and political clout (Nigeria)<sup>10</sup>.

*Through a greater awareness of interdependencies between core and complementary innovations and their current innovation readiness and use to achieve societal outcomes*: A review of documents on innovation profiling and readiness assessment shows how the exercise helped the intervention team to make sense of the different innovation components as one coherent intervention package. In light of the original project proposal, the intervention is appreciated and redefined as a more structured and

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<sup>6</sup> Respondent 1

<sup>7</sup> Innovation profile survey

<sup>8</sup> Scaling fund proposal

<sup>9</sup> 2019 project annual reports

<sup>10</sup> Respondent 1,3 & 6

interconnected set of innovation components and was systematically categorized (Table 2) into products, services, practices and institutional arrangements deemed necessary for the scaling of the technology. The Scaling Readiness assessment shed light on the most pressing bottlenecks that fall under the radar of the intervention at its initial stage.

#### Conclusion 2:

With more emphasis placed on the value of investing on the enabling environment, the intervention team redefined the scaling intervention as packages of innovations and assessed their scaling readiness at the different intervention locations validating the hypothesized causal link between *Hypothesized causal mechanism 1* and *Hypothesized causal mechanism 2* through *Mechanism 'b'*. *Hypothesized causal mechanism 2* was also validated as the definition of context-specific innovation packages and their scaling readiness assessment set the stage for the prioritization of key bottlenecks from the newly included complementary innovations.

*Manifested causal mechanism 2:* “Context-specific innovation packages and the assessment of their scaling readiness”, facilitated, “prioritization of bottlenecks for Flash Dryer in the Cassava starch & flour food value chains”, through “greater awareness of interdependencies between the core and complementary innovations and their current innovation readiness and use to achieve societal outcomes.

***Hypothesized causal mechanism 3:*** “The systematic exploration of strategic options to overcome bottleneck innovations by the intervention team (HAC3)”, will result in “better/different decisions regarding proposed investments and actions as part of a draft scaling strategy (HAO3)”, through “a greater/novel awareness of available options for enhancing the scaling readiness of the innovation packages that are realistic within limitations of the scaling intervention (available time, resources) (f)”.

#### Finding 3:

*Systematic exploration of strategic options to overcome bottlenecks:* At the intervention site in DRC, where there is a stable market demand for Cassava flour (1 million kg/day), the exploration of scaling options was principally geared towards finding ways to improve the technical bottlenecks of the Flash Dryer technology<sup>11</sup>. Apart from technology efficiency issues in Colombia and Nigeria, existing market problems and associated politics were deemed as critical bottlenecks that demanded solutions beyond the resource capacity of the scaling project, creating a momentary uncertainty on future scaling plans in the two intervention locations<sup>12</sup>.

*Better/different decisions regarding proposed investments and actions:* Important scaling decisions were made by the intervention team in view of the prioritized bottlenecks at the different intervention locations. In DRC, a decision was made to continue working to improve the readiness of the prioritized bottleneck innovations. In Nigeria and Colombia, a decision was made to withdraw scaling investments or change the scaling context (geography and value chain). Following such key decisions, new value chains were selected for the scaling of the Flash Dryer in Nigeria (*Yam processing*) and Colombia (*Cassava flour for animal feed* and *Cassava starch for bio-plastics*). A similar decision was to relocate the intervention on

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<sup>11</sup> Respondent 4 and 2020 revisited project workplan

<sup>12</sup> Respondent 2

Cassava flour drying from Colombia to Dominican Republic. However, characterization and/or assessment of the new scaling contexts was not done, an important inflection point from the decision trajectory around design of evidence-based strategy development. For instance, there was little evidence that the use of Flash Dryer for cassava flour in animal feed supplements in Colombia is economically viable<sup>13</sup>. Similarly, it was at the implementation phase of planned activities that the use of the technology for Yam drying was found to require new labour arrangements that are said to obstruct operations<sup>14</sup>.

*Through a greater/novel awareness of available options for enhancing the scaling readiness of the innovation packages that are realistic within limitations of the scaling intervention:* Given the emphasis on the enabling environment (e.g. Market issue) and the follow up strategic decisions to retract proposed scaling investments in Nigeria and Colombia, the failure to characterize or diagnose the new scaling contexts could not be plausibly explained by lack of awareness on the multi-dimensionality of the scaling intervention. Rather, in-depth discussions with the intervention team elucidated the emergence of tension between taking two courses of actions. One, investing resources (time) of a 'short project' for a new round of context assessment that could inform a sound scaling strategy in the long term. Two, taking the risk of introducing the Flash Dryer in uncharted systems that can guarantee intervention promised outcomes (*at least x number of Flash Dryers adopted by Cassava processors*). The project chose the second option in Nigeria and Colombia with the hope that the technology might find its way in the new system<sup>15</sup>.

### Conclusion 3:

The projected causal link between *Hypothesized causal mechanism 2* and *Hypothesized causal mechanism 3* through *mechanism 'e'* is justified as new information on the key bottlenecks animated critical reflection on the potential scaling strategies that might be required to address them in the different intervention locations. Similarly, the empirical evidence from the three intervention countries lends support to *Hypothesized causal mechanism 3* whereby the exploration of options to overcome the prioritized bottlenecks advised decisions to work on improving the readiness of the bottleneck innovations in DRC and withdrawal of planned scaling activities in Nigeria and Colombia. However, with the emergence of a new mechanism (perceived tension between 'short-term' and 'long-term' outcomes) in Nigeria and Colombia, two separate scaling pathways seemed to unfold: one for DRC (*Manifested causal mechanism 3.1*), and another for the new scaling contexts in Nigeria, Colombia and Dominican Republic (*Manifested causal mechanism 3.2 & 3.3*). The scaling decision trajectory for the original scaling contexts in Nigeria and Colombia ended with the withdrawal of resources as shown in *Manifested causal mechanism 3.2*.

*Manifested causal mechanism 3.1 (DRC):* "The systematic exploration of strategic options to overcome technological bottleneck innovations by the intervention team", resulted in "better decisions regarding proposed investments and actions as part of a draft scaling strategy", through "a greater awareness of available options for enhancing the scaling readiness of the innovation packages that are realistic within limitations of the scaling intervention (available time, resources)".

*Manifested causal mechanism 3.2 (Nigeria, Colombia):* "The exploration of options to overcome prioritized bottlenecks by the intervention team", resulted in "a better decision to pull out resources from

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<sup>13</sup> Respondent 2

<sup>14</sup> Respondent 3

<sup>15</sup> Respondent 1&2

original scaling contexts”, through “novel awareness of limitations of the enabling environment that are beyond the resource capacity of the intervention”.

*Manifested causal mechanism 3.3* (Nigeria, Colombia and Dominican Republic): “The exploration of options to continue working on the scaling of the technology in new contexts”, resulted in “the scaling decisions around the development and delivery of the Flash Dryer technology”, through “emerging tension in investing resources in potential system level interventions that were assumed to delay promised outcome within the project’s lifetime”.

***Hypothesized causal mechanism 4:*** “Stakeholder profiling and stakeholder network analysis’ (HAC4)”, will lead to “better/different decisions regarding selection of partners to overcome the innovation bottlenecks” (HAO4), through “a greater/novel awareness of gaps in the competencies that are required for scaling (d)”.

#### Findings 4:

*Stakeholder profiling and stakeholder network analysis:* With the emphasis given to better understanding of the broader scaling context, stakeholder profiling and stakeholder network analysis was conducted<sup>16</sup>. In view of the initial stakeholder engagement plans in the proposal, the stakeholder profiling and network analysis in DRC provided a coherent and detailed account of the stakeholder context. Stakeholder profiling and network analysis did not transpire in Nigeria, Colombia and Dominican Republic as part of the non-characterization of the new scaling contexts.

*Better/different decisions regarding selection of partners to overcome the bottlenecks:* In view of the prioritized bottlenecks and the follow up scaling decisions in DRC, the stakeholder mapping has identified stakeholders that were selected as partners. Partnerships were forged with some of the mapped-out equipment manufacturers and Cassava processors to address the bottleneck innovations. In Nigeria, Colombia and Dominican Republic, where no stakeholder profiling was done for the new contexts, partnerships were formed for the development and/or delivery of the technology.

*Through a greater/novel awareness of gaps in the competencies that are required for scaling:* In DRC, the stakeholder profiling and network analysis not only facilitated the identification of new stakeholders but also generated information on their networks and level of involvement in the Cassava Flash Dryer system. The intervention team highlighted its contribution in further screening and engaging of operational equipment manufacturers and Cassava processors. For Nigeria, Colombia and Dominican Republic little was known about the level of fitness of the new contexts for the scaling of the technology. Given the situation, the intervention team had limited information as to whether the new partnerships were relatively better positioned to improve the likelihood of the scaling of the Flash Dryer technology.

#### Conclusion 4:

In DRC, the investment of scaling resources in stakeholder profiling and network analysis as part of characterizing the different scaling contexts supported the predicted causal link between *Hypothesized causal mechanism 1* and *Hypothesized causal mechanism 4* through *mechanism ‘b’*. Likewise, the findings

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<sup>16</sup> Stakeholder engagement strategy document



evidenced the validity of *Hypothesized causal mechanism 4* as the stakeholder profiling and network analysis supported the characterization and enlisting of broader stakeholders that the implementing partners were part of. As to the new scaling contexts in Nigeria, Colombia and Dominican Republic, the diverging scaling decision trajectory at *Manifested causal mechanism 3.3* has perpetuated whereby the technology-centric scaling approach prescribed the selection of partners working in the technology domain.

*Manifested causal mechanism 4.1 (DRC):* “Stakeholder profiling and stakeholder network analysis”, led to “better decisions regarding selection of partners to overcome the innovation bottlenecks”, through “a greater/novel awareness of gaps in the competencies that are required for scaling”.

*Manifested causal mechanism 4.3 (Nigeria, Colombia and Dominican Republic):* “The decision to work on the technology component of Flash Dryer”, led to, “the selection of implementing partners that work in the development, delivery or uptake of the technology”, through “a limited awareness of the broader innovation and stakeholder context that are required for scaling”.

***Hypothesized causal mechanism 5:*** “The development, presentation and facilitated discussion of a systematically underpinned draft scaling strategy (HAC5)”, will lead to “an agreed-upon scaling strategy and scaling action plan that is supported by relevant stakeholders’ (HAO5)”, through “a better understanding of the scaling strategy building blocks and a greater motivation to collaborate towards overlapping objectives (h)”.

#### Finding 5:

*Development, presentation and facilitated discussion of a draft scaling strategy:* Both document reviews and interviews show the lack of multi-stakeholder consultation and agreement processes in validating the different strategic decisions made by the intervention team. There was evidence for bilateral discussions with (potential) implementing partners in all the intervention locations.

*An agreed-upon scaling strategy and scaling action plan supported by relevant stakeholders:* Through deliberations with implementing partners participation agreements were signed for the development and delivery of project-designed Flash Dryer or the upgrading of bottleneck technology components of operational Flash Dryers in all the intervention locations.

*Through a better understanding of the scaling strategy building blocks and a greater motivation to collaborate towards overlapping objectives:* In DRC, the prioritization of technological bottlenecks and the subsequent technology improvement strategy seemed to encourage the project to engage only with the (potential) partners that are either equipment manufacturers or Cassava processors. Intervention team members highlighted the relatively stable Cassava market environment for ‘fufu’ and the pressing need to improve the identified bottlenecks around the energy and production efficiency of existing Flash Dryers<sup>17</sup>. In Nigeria, Colombia and Dominican Republic, limited information around the new scaling contexts has influenced the stakeholder engagement and partnership agreement process. Even though formal partnership agreements were signed, there were still notable uncertainties due to the lack of information on the broader scaling context. For instance, there were unresolved discussions between the

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<sup>17</sup> Respondent 2&4

intervention team and an implementing partner on the economic viability of using the Flash Dryer for cassava flour in animal feed production<sup>18</sup>. Similarly, the investment and (export) market of the Flash Drying technology in Dominican Republic and potential demand for cassava flour in the USA was yet to be estimated when agreement was reached. A food processing company that acquired the technology for yam drying in Nigeria had to deal with new labour requirements<sup>19</sup>.

#### Conclusion 5:

In all the intervention locations there is no evidence for the participation of the broader stakeholders in the agreement process presenting a Scaling Readiness implementation issue to reflect on the level of validity of *Hypothesized causal mechanism 5*.

*Manifested causal mechanism 5.1 (DRC):* “Discussions with implementing partners about the draft scaling strategy”, led to “an agreed-upon scaling strategy”, through “a better understanding of improvements required to overcome the technological bottleneck innovations”.

*Manifested causal mechanism 5.3 (Nigeria, Colombia and Dominican Republic):* “Bilateral discussions with implementing partners on developing and delivering of the technology”, led to “agreements with implementing partners”, through “alignment of objectives around the development and delivery of the technology and uncertainties on the fitness of the supporting environment”.

***Hypothesized causal mechanism 6:*** “The reflexive monitoring of the implementation of the agreed-upon scaling strategy and scaling action plan (AC6)”, will lead to “improved scaling performance (AO6)”, through “overcoming bottleneck innovations and greater enthusiasm, energy and synergy in the partnership (j & k)”.

#### Finding 6:

*The reflexive monitoring of the implementation of the agreed-upon scaling strategy and scaling action plan:* In DRC, some of the follow up planned activities on the upgrading, installation or performance testing of the Flash Dryer technology were implemented despite the COVID situation. An online support network among the intervention team and implementing partners was used to facilitate information exchange and backstopping around improvements needed on the technological bottlenecks. For the new scaling contexts, the project was phasing out before it had the chance to implement activities or reflect on its rather technology-centric scaling strategies.

*Improved scaling performance:* Implementation of some of the follow-up activities in DRC have improved the readiness of the technological bottlenecks (e.g., Heat exchanger, Blower, Feed system)<sup>20</sup>. There were technical bottlenecks that remained with low readiness due to failure/delays to implement planned activities where COVID restrictions seemed to play a major part.

*Though overcoming bottleneck innovations and greater enthusiasm, energy and synergy in the partnerships:* The online collaborative platform showed the presence of a continued collaborative learning

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<sup>18</sup> Respondent 2

<sup>19</sup> Respondent 4

<sup>20</sup> Scaling Readiness assessment survey



and support system that helped processors in DRC to improve the efficiency of their Flash Dryers. Some of the implementing partners have indicated that this has contributed to their learning on how improvements on the identified technology efficiency problems can improve their productivity and profitability. Cassava Processors continued to engage with the online platform even after the official closing of the project in December 2020<sup>21</sup>.

#### Conclusion 6:

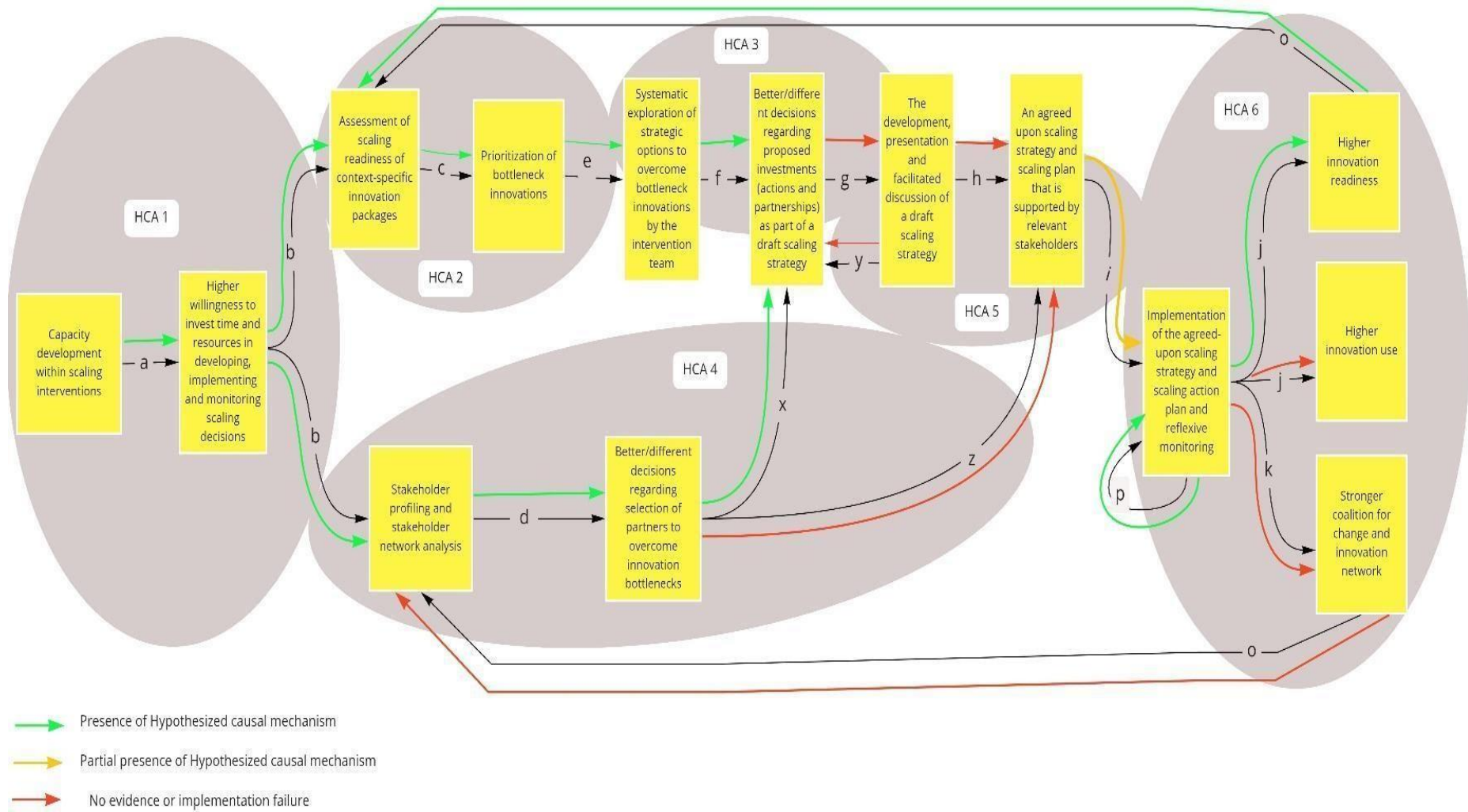
Observed improvements in the innovation readiness of the prioritized bottlenecks through a reflexive type of monitoring around the implementation of the agreed-upon scaling activities in DRC is in compliance with *Hypothesized causal mechanism 6*.

*Manifested causal mechanism 6 (DRC):* “The reflexive monitoring of the agreed-upon technology improvement activities” led to “improved technology readiness (MAO6)”, through “overcoming technological bottleneck and greater enthusiasm, energy and synergy in the partnership”.

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<sup>21</sup> Respondent 6 & 2020 project annual report

Figure 2: Level of presence of the assumed causal mechanisms in the Cassava Flash Dryer case



**Hypothesized causal mechanism 1:** ‘Capacity development within scaling interventions (HAC1)’ will lead to ‘higher willingness to invest time and resources in developing, implementing and monitoring evidence-based scaling strategies’ (HAO1), through ‘a better understanding of the key principles and concepts underlying scaling of innovation’ (a).

Finding 1:

*Capacity development within scaling interventions:* A key aspect of the scaling readiness capacity building activity was a three-day workshop organized and facilitated by the Scaling Readiness developers on scaling of innovations concepts and principles underlying Scaling Readiness<sup>22</sup>. The project intervention team also had access to available Scaling Readiness conceptual documents and implementation guidelines on the design, implementation and monitoring of scaling strategies<sup>23</sup>.

*Higher willingness to invest time and resources in developing, implementing and monitoring evidence-based scaling strategies:* The scaling project has partially committed its time and resources for the development of evidence-based scaling strategies for the different intervention locations. In light of the scaling fund proposal, the intervention is redefined as a package of innovations that directly progressed to the design of the scaling strategies. Some of the planned scaling activities were implemented where a reflexive type of monitoring during the implementation has not sufficiently transpired<sup>24</sup>.

*Through better understanding of the key principles and concepts underlying scaling of innovation:* From interviews and document review, Scaling Readiness is essentially understood as an approach that helps create more opportunities for a collaborative implementation of the scaling project. The intervention team believed that resources (time, human, financial) can be leveraged from implementing partners while giving the partners a room to focus on a specific intervention component of the package. There was a marked tendency to see Scaling Readiness approach as a set of activities that can benefit the project without necessarily adhering to all its recommended activities<sup>25</sup>. A key project decision maker questions the emphasis placed by the approach on ‘processes’ rather than ‘deliverables’ with the implication of ‘reaching as many beneficiaries as possible with the technology’<sup>26</sup>. This view is further exhibited in the intervention team’s perceived discordance between a reflexive type of monitoring and the conventional monitoring and evaluation approach that they have been enacting<sup>27</sup>.

Conclusion 1:

The observed stakeholder-focused view or understanding of Scaling Readiness seemed to have affected the willingness of the intervention team to fully commit time and resources in developing, implementing and monitoring evidence-based scaling strategies. The divergent understanding on Scaling Readiness should be considered as a salient mechanism between ‘capacity development’ and ‘partial willingness to

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<sup>22</sup> 2019 project annual report

<sup>23</sup> Respondent 9

<sup>24</sup> 2019 & 2020 project annual report

<sup>25</sup> Respondent 8 & 9

<sup>26</sup> Respondent 8

<sup>27</sup> Respondent 9

design, implement or monitor evidence-based scaling strategies', albeit the 'partial willingness' appear to also be triggered by another plausible mechanism (established partnerships) at the different stages of scaling strategy development and implementation process (see *Manifested causal mechanism 2,3&4*).

*Manifested causal mechanism 1*: "Capacity development within scaling interventions", led to "partial willingness to invest time and resources in the developing, implementing and monitoring evidence-based scaling strategies", through "limited understanding of the underlying principles and concepts of scaling of innovation (greater appreciation of Scaling Readiness as a stakeholder engagement tool)".

***Hypothesized causal mechanism 2***: 'Context-specific innovation packages and the assessment of their scaling readiness' (HAC2), will facilitate 'the prioritization of bottleneck innovations' (HAO2), through 'a greater awareness of interdependencies between core and complementary innovations and their current innovation readiness and use to achieve societal outcomes' (c).

#### Finding 2:

*Context-specific innovation packages and the assessment of their scaling readiness*: The original design of the scaling project has 'OFSP puree as a baked and fried product' as its main technology with 5 other supporting intervention areas in the value chain for scaling the technology<sup>28</sup>. The Scaling Readiness innovation profiling produced 8 additional complementary innovations common among the 3 countries. Further validation with stakeholders enabled the addition of new complementary innovations and the removal of others, resulting to 9 complementary innovations. The scaling readiness assessment of the new innovation packages was not done at this particular stage of the project.

*Prioritization of bottleneck innovations*: No systematic prioritization of bottleneck was made to gauge if some bottlenecks were more important than others before moving into partnerships or the design of scaling activities.

*Through a greater awareness of interdependencies between core and complementary innovations and their current innovation readiness and use to achieve societal outcomes*: The innovation profiling is acknowledged in documents and interviews as a useful exercise in shaping the intervention teams' original thinking of the scaling project<sup>29</sup>. The 1<sup>st</sup> year annual project report emphasized how the intervention team redefined the whole intervention after the realization that the scaling of OFSP Puree stands little chance to succeed and depends on several support pillars referred to as complementary innovations. Partnerships were (informally) established before bottlenecks were prioritized and working across the whole value-chain (around most of the complimentary innovations) with the partners was considered as a workable intervention option. Moreover, a member of the intervention team highlighted a potential key bottleneck (OFSP Puree processing equipment) that could not be part of the intervention due to PMU project investment regulations<sup>30</sup>. It appears that there is some divergence of views in what the critical bottlenecks could be, and perhaps to the limited emphasis placed on bottleneck prioritization.

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<sup>28</sup> Scaling fund proposal

<sup>29</sup> Respondent 8 & 9

<sup>30</sup> Respondent 8

## Conclusion 2:

*Hypothesized causal mechanism 2* is partially manifested whereby the definition of context-specific innovation packages facilitated greater appreciation of relevant supporting innovations needed for the scaling of OFSP Puree. However, already established (informal) partnerships have most likely played an important factor for the limited emphasis given to the prioritization of bottleneck innovations or the relative importance of the complementary innovations that are anticipated to dictate future scaling investments of the intervention. The existing partnership trajectory as a key causal force or mechanism in influencing scaling decisions is explained under stakeholder profiling and network analysis (*Hypothesized causal mechanism 4*) and the exploration of strategic options (*Hypothesized causal mechanism 3*).

*Manifested causal mechanism 2*: “Context-specific innovation package and its validation with stakeholders”, facilitated “the identification of new complementary innovations and the modification of others”, through “a greater awareness of interdependencies between core and complementary innovations”.

***Hypothesized causal mechanism 3***: ‘The systematic exploration of strategic options to overcome bottleneck innovations by the intervention team’ (HAC3), will result in ‘better/different decisions regarding proposed investments and actions as part of a draft scaling strategy’ (HAO3), through ‘a greater/novel awareness of available options for enhancing the scaling readiness of the innovation packages that are realistic within limitations of the scaling intervention (available time, resources)’ (f).

## Finding 3:

*The systematic exploration of strategic options to overcome bottlenecks*: A work plan meeting was held in Kenya whereby potential scaling activities in line with the different complementary innovations (as wide-ranging bottlenecks) were presented and evaluated. The process principally hinged on draft work plans (activities, budget, timelines) put forward by the implementing partners<sup>31</sup>.

*Better/different decisions regarding proposed investments and actions as part of a draft scaling strategy*: Initially proposed scaling activities and associated funds on proposal were adjusted as per the new scaling work plans developed around the complementary innovations<sup>32</sup>.

*Through greater/novel awareness of available options for enhancing the scaling readiness of the innovation packages that are realistic within limitations of the scaling intervention*: Exploring options to work on the different complementary innovations was a process that was championed by the implementing partners rather than the intervention team. The intervention team believed that capitalizing on existing work and networks of implementing partners around the different complementary innovations was a viable strategy. For instance, contract farming for provision of healthy roots and vines and farmer organization for aggregation of OFSP roots was a strategy that capitalized on existing development practices of an implementing partner. Similarly, to help mitigate cold storage challenges, an option proposed by a partner on the processing of puree into sweet potato flakes was considered (Workplan).

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<sup>31</sup> 2019 Workplan review workshop report

<sup>32</sup> Respondent 7; 2019 Workplan review workshop report; 2019 project annual report

### Conclusion 3:

The fact that proposed scaling action plans were based on the newly defined innovation packages partially supports *Hypothesized causal mechanism 3*. However, existing partnerships still continued to exert their impact in shaping decisions regarding proposed scaling investments and actions.

*Manifested causal mechanism 3*: “The exploration of options to work on the complementary innovations by the implementing partners and the intervention team”, resulted in “decisions regarding proposed investments on the complementary innovations”, through “willingness to capitalize on implementing partners’ proposed work plans”.

***Hypothesized causal mechanism 4***: ‘Stakeholder profiling and stakeholder network analysis’ (HAC4)’, will lead to ‘better/different decisions regarding selection of partners to overcome the innovation bottlenecks’ (HAO4), through ‘a greater/novel awareness of gaps in the competencies that are required for scaling’ (d).

### Finding 4:

*Stakeholder profiling and stakeholder network analysis*: The stakeholder profiling and network analysis was enacted in Uganda and Malawi and generated richer information on the type and levels of involvement of stakeholders in the OFSP value chains at the different intervention locations<sup>33</sup>.

*Better/different decisions regarding selection of partners to overcome the innovation bottlenecks*: Even though informal partnerships appear to be already in place, formal partnerships were formed with 8 implementing partners (of which 2 were new partners) after the stakeholder characterization. The number and diversity of implementing partners has proportionally increased with the increase in complementary innovations.

*Through a greater/novel awareness of gaps in the competencies that are required for scaling*: Partners’ geographic presence and their assumed specialization around the complementary innovations were said to be among the main criteria for their selection<sup>34</sup>. However, the key implementing partners have a longer history of working relationships with CGIAR/CIP research projects on OFSP which seem to have a life of its own. A respondent from an implementing partner alluded to active and previous projects his organization has been involved in and how the working relationship was a key factor in engaging in the OFSP Puree scaling project<sup>35</sup>. An intervention team member also highlighted the close working ties they had with most of the key partners<sup>36</sup> and some of them were already designated as ‘output leaders’ in the project proposal. This is indicative of the presence of path dependency in partnerships. If commitments – formal or otherwise – have been made to partners at a relatively early stage it can be difficult to change that plan because of the social ties involved.

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<sup>33</sup> Stakeholder engagement strategy document

<sup>34</sup> Respondent 8 & 9

<sup>35</sup> Respondent 12

<sup>36</sup> Respondent 10



#### Conclusion 4:

Even with a strong presence of path dependence on partnerships, the stakeholder profiling and stakeholder network analysis has informed the inclusion of two additional implementing partners lending some support to *Hypothesized causal mechanism 4*. However, in the broader scaling practices of the intervention, existing partnership trajectories influenced partnership choices as well as the overall scaling investments and action plan design.

*Manifested causal mechanism 4:* “Stakeholder profiling and stakeholder network analysis”, facilitated “decisions regarding selection of two additional partners to work on the complementary innovations”, through “path-dependency in existing partnership trajectory and a greater awareness of gaps in the competencies that are required for scaling”.

***Hypothesized causal mechanism 5:*** “The development, presentation and facilitated discussion of a systematically underpinned draft scaling strategy (HAC5)”, will lead to “an agreed-upon scaling strategy and scaling action plan that is supported by relevant stakeholders (HAO5)”, through “a better understanding of the scaling strategy building blocks and a greater motivation to collaborate towards overlapping objectives (h)”.

#### Finding 5:

*The development, presentation and facilitated discussion of a draft scaling strategy:* Partners-championed scaling work plans around the different complementary innovations were presented and thoroughly discussed with the broader stakeholders working in the system. Each partner came with their activity plans which went through engaging consultation and feedback processes<sup>37</sup>.

*An agreed-upon scaling strategy and scaling action plan that is supported by relevant stakeholders:* The development of the draft scaling work plans and the agreement processes went concurrently whereby on a consultation meeting; an agreement was reached to hold a follow-up bilateral meeting with each implementing partner. Through the bilateral meetings MoUs were developed for all the locations and signed (Kenya) to kick off the partnerships<sup>38</sup>.

*Through a better understanding of the scaling strategy building blocks and a greater motivation to collaborate towards overlapping objectives:* Document review of the stakeholder consultation meetings on the content of the proposed scaling work plans showed the provision of detailed feedback for the implementers before going into the formal partnership agreements. Areas of synergy and collaboration were also identified around some activities between the intervention team and implementing partners on one hand, and between implementing partners and other participant stakeholders on the other hand. The wider stakeholder consultation process was principally on the content of the draft scaling work plan with no evidence for the presence of deliberation on the partnership aspect of the scaling strategy or work plan.

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<sup>37</sup> 2019 Workplan review workshop report

<sup>38</sup> 2019 project annual report

#### Conclusion 5:

The scaling strategy agreement process ascertains the validity of *Hypothesized causal mechanism 5* as deliberations with the broader stakeholders facilitated agreements on the proposed activity plans. Again, the effect of pre-established partnerships is further manifested in the absence of deliberation on partnership and/or partnership models.

*Plausible causal mechanism 5:* “The development, presentation and facilitated discussion of scaling work plan around the different complementary innovations”, led to “an agreed-upon scaling work plan that is supported by relevant stakeholders” through “a better understanding of the scaling activities and limited space to reflect on the selection of partners and partnerships”.

***Hypothesized causal mechanism 6:*** “The reflexive monitoring of the implementation of the agreed-upon scaling strategy and scaling action plan (HAC6)”, will lead to “improved scaling performance” (HAO6), through “overcoming bottleneck innovations and greater enthusiasm, energy and synergy in the partnership (j & k)”.

#### Finding 6:

Despite the COVID situation, interviews and few quarterly reports of implementing partners indicated the implementation of planned activities around some of the complementary innovations. However, there is little evidence for the presence of a reflective type of monitoring and learning process (short-loop monitoring) that Scaling Readiness suggests to guide the implementation of such activities<sup>39</sup>. A scaling readiness diagnosis (long-loop monitoring) that was conducted by the end of the project demonstrated a high readiness and/or use of some of the complementary innovations at the different locations.

#### Conclusion 6:

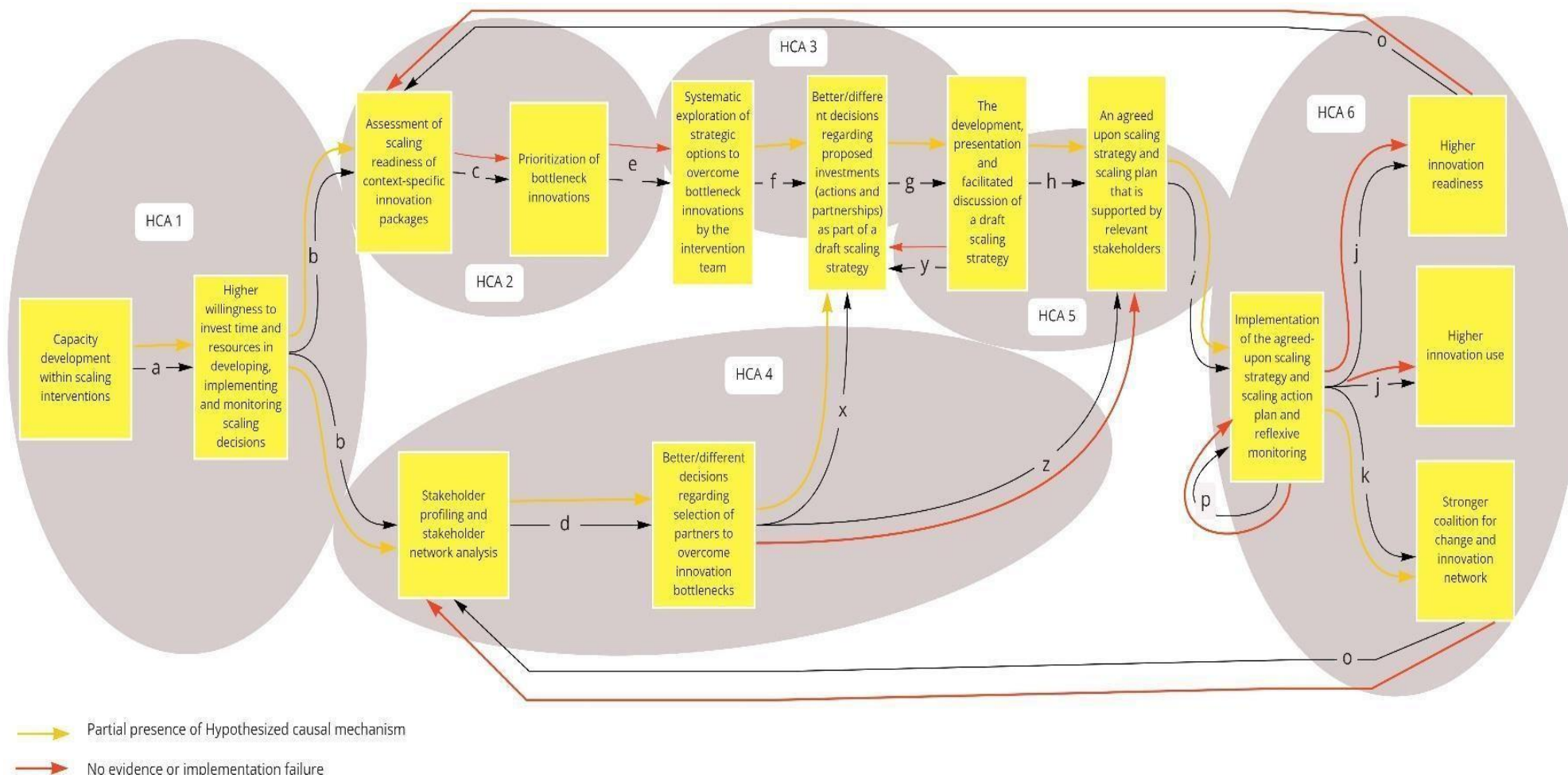
Improvement in scaling readiness cannot be claimed due to lack of information on innovation readiness and use at the initial stage of the project. Similarly, absence of reflexive monitoring and learning processes is a ‘black box’ to reflect on the process of implementation of activities up until the scaling readiness assessment was done.

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<sup>39</sup> Scaling Readiness concepts, practices and implementation workbook



Figure 3: Level of presence of the assumed causal mechanisms in the OFSP Puree case



## EQ1.2. How and to what extent did Scaling Readiness influence the design, implementation and monitoring of scaling strategies in the two projects?

The analysis presented here provides a substantive account of the extent to which the Scaling Readiness approach influenced the design, implementation and monitoring of scaling strategies in the evaluated case studies.

### Cassava flash dryer case

#### *Design of scaling strategies*

#### 1. Context-specific understanding of the scaling ecosystem

Looking into the timeline of events (Annex), a comprehensive characterization of the scaling context in the different intervention locations happened in the first year (April- August 2019) of the scaling project implementation. In view of the initial depiction of the scaling context in the proposal, the Scaling Readiness innovation profiling and stakeholder mapping gave a far richer and coherent synthesis of the scaling ecosystem. The innovation profiling redefined the intervention as technical, organizational, knowledge and institutional innovations deemed relevant in enhancing the system's capacity for the scaling of the Flash Dryer technology. The project proposal mentioned 5 supporting innovations (Table 2) that were considered sufficient for the scaling of the technology. The innovation profiling identified 11 additional and context-specific complementary innovations as potential intervention points. The profiling exercise was crucial in the sense that some of the innovation components that were found to be key bottlenecks were among the complementary innovations included through the Scaling Readiness innovation profiling.

Table 2: Intervention definition before and after Scaling Readiness

	initial intervention profile (Fund proposal)	Relevant intervention locations	Scaling informed package	Readiness innovation	Relevant intervention location	Innovation type
Core innovation	Energy-efficient flash drying at small-scale	Nigeria, DRC, Colombia	Energy-efficient flash drying at small-scale		Nigeria, DRC, Colombia	Product
Complementary innovations			Improved Feed system		Nigeria, DRC, Colombia	
			Improved Blower/Fan		Nigeria, DRC	
			Improved Hot air generator/Heat exchanger		Nigeria, DRC	
	Improve Dewatering technology	Nigeria, DRC, Colombia	Improve Dewatering technology		Nigeria, DRC, Colombia	
			Improve Hot air generator		Nigeria, DRC, Colombia	
			Improve perception of cassava flour		DRC	Service

			Marketing cassava flour promotion	Nigeria	
	Capacity Building – Flash drying, dryer designs	Nigeria, DRC, Colombia	Capacity Building – Flash drying, dryer designs	Nigeria, DRC, Colombia	
	Business plans development and access to finance	Nigeria, DRC, Colombia	Capacity Building - Business plans	Nigeria, DRC, Colombia	
			Access to capital or loans	Nigeria, DRC, Colombia	
			Inventory of ongoing projects on cassava processing for potential synergy	Nigeria, DRC, Colombia	
			Continuous technical support	Nigeria, DRC, Colombia	
	Organizational models for creating enabling conditions for technology	Nigeria, DRC, Colombia	Innovation forum	Nigeria	
			Testing expansion quality	Colombia	Practice
	Economic feasibility of investments in Flash Dryer	Nigeria, DRC, Colombia	Economic feasibility of investments in Flash Dryer	Nigeria, DRC, Colombia	
			Cooperatives formation for collective Cassava root marketing	Nigeria, DRC, Colombia	Institutional arrangement
			Agreements and formal contracts among implementing partners	Nigeria, DRC, Colombia	

## 2. Identification of key bottlenecks and frame conditions for the scaling of the Flash Dryer

Redefining the scaling interventions as 'Innovation packages' at the different intervention locations set the stage for the prioritization of bottlenecks and identification of frame conditions in the Cassava Flash Dryer system. *Market problems* for Cassava flour in Nigeria and Colombia; Flash Dryer *Blower* problem and inefficient *Heat exchanger* in Nigeria and DRC; and *Low expansion quality* of Cassava starch from the Flash Dryer in all the three locations were among the newly included complementary innovations that were found to have low scaling readiness. The absence of an open market for Cassava flour in Colombia and problems of market access in Nigeria were rather insinuated as 'frame conditions' that the project cannot do much within the limits of its resources. The Nigerian market problem is a mismatch between production capacity of the small-scale cassava flour processors to meet the demands of large-scale companies. In addition, a political<sup>40</sup> dimension kept small-scale processors from benefitting from existing government policy for cassava flour marketing. These bottlenecks and frame conditions affected scaling decisions later made at the different intervention locations. Table 3 summarizes the key bottlenecks identified through the characterization and the assessment of scaling readiness at the different intervention locations.

<sup>40</sup> A 2010 government legislation requiring all big wheat millers to use Cassava flour as a substitute (10%) to wheat flour couldn't be practiced due to existing influence from powerful (political) actors benefiting from wheat import.

Table 3: Core bottlenecks identified

	Bottlenecks	Description
Nigeria	Market access	Market outlet problems for small scale Cassava flour processors due to powerful large flour processing companies
	Inefficient Blower/fan	Existing flash dryers used by processors do not achieve sufficient air velocity and flow rate, which limits production capacity
	Hot air generator/Heat exchanger	Problem with the design of the heat exchanger affecting energy efficiency of the Flash Dryer
Colombia	No flour market	Absence of open market for Cassava flour for food and limited awareness on (nutritional) benefits
	Low expansion quality	Low expansion quality of flash-dried sour starch compared to sun-dried
	Innovation platforms	To facilitate multi-stakeholder dialogue on the benefits of Flash Dryer in cassava value chain
DRC	Inefficient Blower/fan	Existing flash dryers used by processors do not achieve sufficient air velocity and flow rate, which limits production capacity
	Hot air generator/Heat exchangers	Problem with the design of the heat exchanger affecting energy efficiency of the Flash Dryer

### 3. Making evidence-based scaling decisions

As generally illustrated in the theory validation part, the context characterization and bottleneck prioritization influenced important scaling decisions. This is particularly the case in Nigeria and Colombia where planned scaling activities and associated resources were withdrawn and shifted to different locations and value chains for the scaling of the Flash Dryer. In this regard, the project went through two strategic scaling decisions (Table 4); 1) in pulling out resources and, 2) in shifting to different scaling contexts. Scaling readiness has informed the decisions to withdraw resources (*Reorient* and *Relocate*) in Colombia and Nigeria, and to work on the technological bottlenecks in DRC (*Develop*). Conversely, Scaling Readiness was not used to generate evidence on whether the new locations and value chains were better positioned for the scaling of the Flash Dryer technology. Given the limited available information about the enabling environment of the new contexts, this part of the scaling decision can be considered as a point of retraction towards a more technology-focused scaling approach where Scaling Readiness has little contribution. The new (planned) activities were essentially around the fabrication, installation, design improvement or performance testing of the technology component of the package. Relatedly, the stakeholder profiling and network analysis of Scaling Readiness has not meaningfully influenced the partnership engagement model as part of the new scaling strategy. Indeed there were new partnerships established as a result of the shift to new scaling contexts. However, it is not self-evident that the new partnerships were the most appropriate for the scaling of the technology. Little is known about the broader context wherein the technology operates, which, in principle, should have informed the selection of implementing partners.

Table 4: Key bottlenecks and strategic scaling decisions

	Key bottlenecks	Strategic decisions
Nigeria	Market problem	Using the technology in Yam drying as a potential intervention area for the scaling of the dryer technology ( <i>Reorient</i> )
	Inefficient Blower/fan	Improve the technical efficiency of the blower
	Hot air generator/Heat exchanger	Upgrade the design of Heat exchanger
Colombia	No flour market	Using the Flash Dryer for cassava flour for animal feed production ( <i>Reorient</i> )
		Using the technology for cassava flour for the food industry in Dominican Republic ( <i>Relocate</i> )
	Low expansion quality	Using the technology for high-grade cassava starch for bio-plastics was decided. ( <i>Reorient</i> )
DRC	Inefficient Blower/fan	Improve the technical efficiency of the blower
	Hot air generator/Heat exchanger	Upgrade the design of the heat exchanger

### *Implementation of scaling decisions and reflexive monitoring*

Notwithstanding the significant effect of COVID on the overall implementation of planned activities, there was some collaborative work done around the identified technological bottlenecks. As part of the Scaling Readiness Stakeholder engagement plan, a social media platform (WhatsApp) was set up and used for regular monitoring, information exchange and learning. The online learning network involved 1) cassava processors investing in flash drying technology, 2) equipment manufacturers contracted to build the equipment, and 3) the technical support team of CIAT-CIRAD-IITA responsible for advising on the design, manufacturing, installation or testing of the equipment. The participants exchanged information in text, photos and videos formats where specific concerns around technology component design and manufacturing techniques were addressed.

### **Box 1: Influence of Scaling Readiness**

- *A significant influence of Scaling Readiness on the scaling strategy design is the identification and prioritization of context-specific bottleneck innovations that were unknown to the scaling intervention (Nigeria and Colombia).*
- *Scaling Readiness advised the withdrawal of resources from scaling contexts with bottlenecks beyond the limits of the intervention to address (Nigeria and Colombia).*
- *The influence of Scaling Readiness in catalyzing broader stakeholder engagement slowed down after a technology-centric scaling approach was pursued in the new scaling contexts (Nigeria, Colombia and Dominican Republic).*
- *Scaling Readiness, through its proposed stakeholder engagement strategy, fostered reflexive monitoring and learning around the implementation of scaling activities that led to improvements in the readiness of the bottleneck innovations (DRC)*

*Design of scaling strategies***1. Context-specific understanding of the scaling ecosystem**

As part of the characterization, the scaling readiness innovation profiling facilitated the transformation of the projects' initial scope and envisaged areas of scaling interventions. The profiling facilitated the inclusion of 8 new complementary innovations (Table 5) that were not considered at the initial stage of the scaling project. Further validation with stakeholders played an important role in the inclusion of some innovation components (e.g., Contract farming) and the exclusion of others (Climate controlled storage for OFSP roots) that shaped subsequent scaling strategies and activities of the project.

Table 5: Intervention definition before and after Scaling Readiness

	initial intervention profile (Fund proposal)	SR informed innovation package (By the intervention team)	SR informed innovation package (After validation with stakeholders)	Relevant intervention location	Innovation type
Core innovation	OFSP fresh roots are steamed and processed into a paste (purée) in food processing, especially for baked and fried products	Use OFSP puree for baked and fried products by formal and street vendors	Use OFSP puree for baked and fried products by formal and street vendors	Kenya, Malawi, Uganda	Product
Complementary innovations	Post-harvest loss management through improved sales of OFSP roots (no postharvest technology or practice)	Storage technologies for OFSP roots	Climate-controlled storage for OFSP roots (identified as not achievable with available resources)	Kenya, Malawi, Uganda	
		Storage technologies for OFSP puree at processor level	Cold chain for OFSP puree for sales and storage of stable puree	Kenya, Malawi, Uganda	
	Technology Transfer and Technology Demonstration (equipment demonstrations, recipe formulations)	Access to OFSP puree processing technologies equipment for independent processors	Access OFSP puree processing technologies equipment for independent processor	Malawi, Uganda	
	Extension service on good agronomic practices	Extension service on good agronomic practices	Delivery of extension services	Kenya, Malawi, Uganda	
		Training on best practices on harvesting and post-harvest handling, temporary storage before taking roots to aggregation centers			
	Strong OFSP Fresh Roots Supply chain	Disease- and pest-free OFSP planting materials	Processing friendly OFSP varieties for production by commercial farmers	Kenya	

			Contract farming for provision of disease- and pest-free seeds and vines	Kenya, Malawi, Uganda	Institutional arrangement
	Demand Creation Through Nutrition Promotion and Market Development for OFSP Roots and Processed Products	Social behavior change and communication (SBCC) guidance targeting OFSP and products in place	Advocacy and Awareness campaign on benefits of OFSP	Kenya, Malawi, Uganda	Service
		Business development plans and capacity building facilities in place e.g., incubation centers	OFSP Puree Business Development Guide	Kenya, Malawi	
Technology demonstration for OFSP puree users in formal and informal sectors		Demonstrations of OFSP Puree processing and packaging equipment	Kenya, Malawi, Uganda		
Food safety for puree processors and end users					
		Access to credit information for farmers linked to OFSP processing.	Credit access guide(manual) for OFSP producers and credibility assessment guidelines on OFSP production for banks	Kenya, Malawi, Uganda	

## 2. Complementary innovations informing scaling strategies

Redefining the scaling intervention as a package of component innovations set the stage for the inclusion of new scaling activities and partnerships along the different supporting innovations for the scaling of OFSP Puree. In this regard, almost all complementary innovations were considered by the project as important intervention areas or bottlenecks that required investment for successful scaling. Pre-existing ties with key implementing partners and their active involvement in the characterization and identification of potential intervention areas have likely contributed to the design of scaling activities that covered the entire innovation package.

## 3. Reinforcing existing partnership and forging new ties among broader stakeholders

A diverse group of stakeholders were involved in the characterization of the innovation context and the appraisal of scaling work plans of implementing partners around the different intervention components of the scaling project. Stakeholders that ended up being implementing partners after the characterization, had a longer working relationship with the intervention team and were already mentioned as potential partners in the scaling fund proposal. In this regard, the influence of Scaling Readiness can mainly be seen from the perspective of consolidation of existing partnerships as new engagement venues opened with the inclusion of additional complementary innovations. However, the broader stakeholder engagement

during the characterization and the scaling work plan appraisal has created opportunities for new working relationships within and beyond the scaling project. The scaling work plan meeting with stakeholders in Kenya highlighted the presence of many organizations working in isolation around the different complementary innovations. For instance, a concern was flagged by a representative of the Kenyan Ministry of health about the poor stakeholder awareness on the Ministry's effort to promote OFSP in its Nutrition Action Plan. Some stakeholders were promoting 'soggy' OFSP varieties and didn't know that there were better varieties in the system (CIP). There were opportunities for business model development and financial grants from some of the stakeholders that participating private sector actors did not know about (Annual report).

### *Implementation and Monitoring*

Some of the planned scaling activities around the different complementary innovations (Extension services, Business development, Behavioral change communication, Technology demonstration and Market services) have been implemented despite considerable COVID restrictions. However, Scaling Readiness appeared to have little influence on scaling activity monitoring where the approach was anticipated to inspire a reflexive monitoring and learning during the implementation of agreed scaling practices. As to the lack of such a process, interviews revealed a perceived disconnect between 'accountability-oriented' organizational monitoring and evaluation system, and the 'learning-oriented' monitoring approach of Scaling Readiness, which is felt as an additional burden. By the end of the project Scaling Readiness was used to Diagnose the intervention whereby relevant information was generated on the level of readiness and use of the different innovation components.

### **Box 2: Influence of Scaling Readiness**

- *Scaling Readiness has influenced the design of scaling strategy of the OFSP Puree scaling intervention through the inclusion of new supporting innovation components relevant for the scaling of the technology.*
- *The inclusion of new supporting innovations opened additional venues within the intervention for further collaboration among established group of partners, mainly reinforcing existing partnerships.*
- *Scaling Readiness has facilitated the involvement of wider stakeholders in the scaling strategy development process.*
- *The fact that Scaling Readiness could not inform the design of bottleneck-focused scaling strategy shows how the approach is there not only to influence but also be influenced by existing system (partnership) trajectory.*



### EQ1.3. How and to what extent does Scaling Readiness contribute to improved innovation readiness and innovation use of innovation packages of the scaling projects?

#### Cassava flash dryer case

In DRC where a decision was made to develop the prioritized bottleneck innovations, processors made recommended modifications around the heat exchanger, blower and feed system that improved the level of *innovation readiness* of the Flash Dryer. The online monitoring and support network created as part of the Scaling Readiness partners engagement plan has facilitated continuous information exchange and backstopping during the process of modifying the technology. The LAYUKA processor in DRC, for example, modified the heat exchanger and achieved a 33% reduction in fuel consumption (Annual report). Another processor, NutriPro, improved the heat exchanger that contributed to a reduction in fuel consumption by 30%. In a relatively steady market and demand for Cassava products. A processor (NutriPro) in DRC explained an unprecedented improvement in production capacity from 60 kg/hr to 150 kg/hour as a result of improvements made to the heat exchanger. During the time of our evaluation, the intervention team was developing and calibrating the fans/blowers and the cyclone in a partner's workshop with a potential to further improve production capacity to 300 kg/hr. According to one of the DRC processors, the observed improvement in the *innovation readiness* of the technology has the potential to galvanize wider use of the technology (*innovation use*) as the new production and energy efficiency is attracting the attention of cassava processors in the system.

#### OFSP Puree case

By the closing of the project, it was found that in all the intervention locations, delivery of extension services was the most used complementary innovation whilst productive varieties were at the highest level of innovation readiness. OFSP puree business development services were at a high level of innovation readiness in Uganda and puree processing equipment recorded the highest use in Kenya. Given the extension services around agronomic practices and nutrition, business development models were among the few supporting innovations specified in both the project proposal and the Scaling Readiness characterization. A good level of readiness and use by the end of the project would definitely have implication for the scaling of the OFSP Puree. However, this could only be objectively established if levels of readiness of the complementary innovations were known around the beginning of the scaling project.

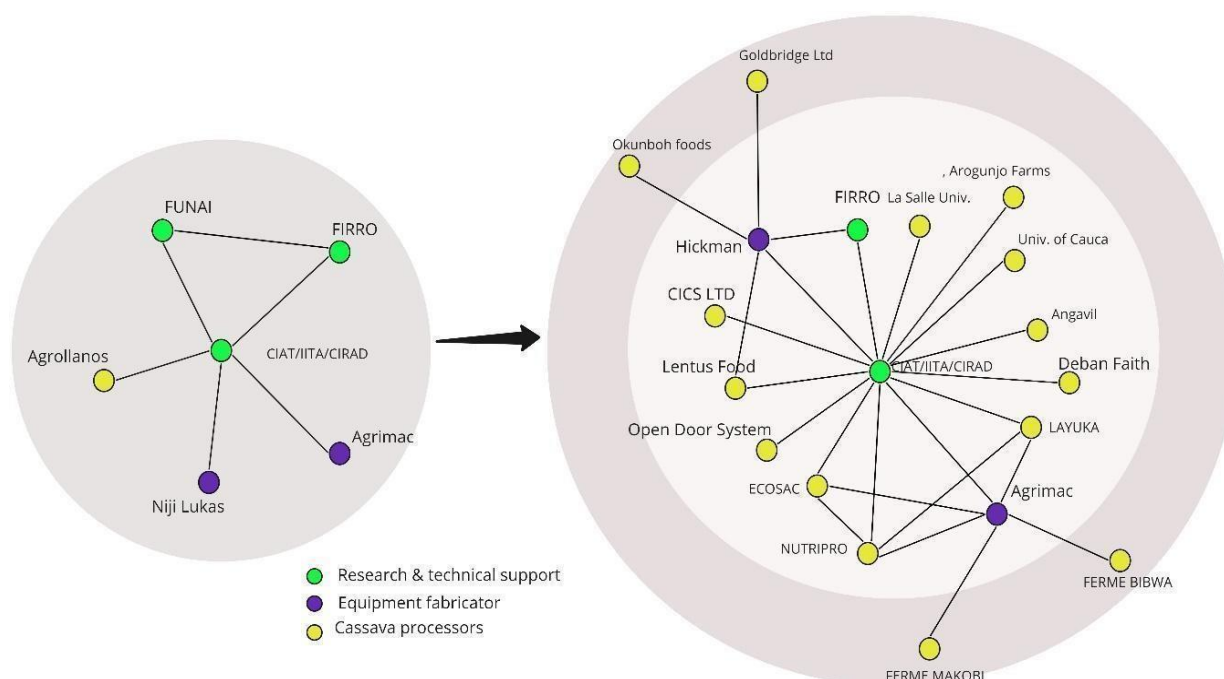
### EQ1.4. How and to what extent does Scaling Readiness contribute to stronger coalitions for change in innovation networks?

Our assessment of Scaling Readiness contribution in stakeholder coalition building is limited to the number and diversity of stakeholders that are directly or indirectly involved and interacted during the course of the projects' implementation. Information unavailability bounds us from reflecting on any change in interaction 'quality' that Scaling Readiness might have contributed to.

## Cassava flash dryer case

The stakeholder profiling and network analysis facilitated the identification of new stakeholders, their networks and level of involvement in the Cassava Flash Dryer system. In Nigeria 45 key stakeholders were identified and only 3 of them were included in the initial project proposal. Similarly, 25 key stakeholders were identified for DRC where only 2 of them were mentioned in the original project proposal. In the process of the scaling strategy development and implementation, the number of stakeholders that are directly (partners) or indirectly involved in the scaling project has increased but the diversity remained the same (Figure 4). The first tier of stakeholders consists of the formal partnerships between the project intervention team and direct implementing partners in the different locations. The focus on the technology component of the package and the eventual limited involvement of broader stakeholders in the strategy development and agreement process has limited the contribution of Scaling Readiness in improving stakeholder networks. On the other hand, with the improvements in the readiness of some of the prioritized bottlenecks in DRC, the collaborative learning platform during the implementation of activities can be considered as a promising partner collaboration process that would have potential positive implications for coalition building in the broader innovation network.

Figure 4: Active stakeholder networks before SR characterization and after scaling strategy design

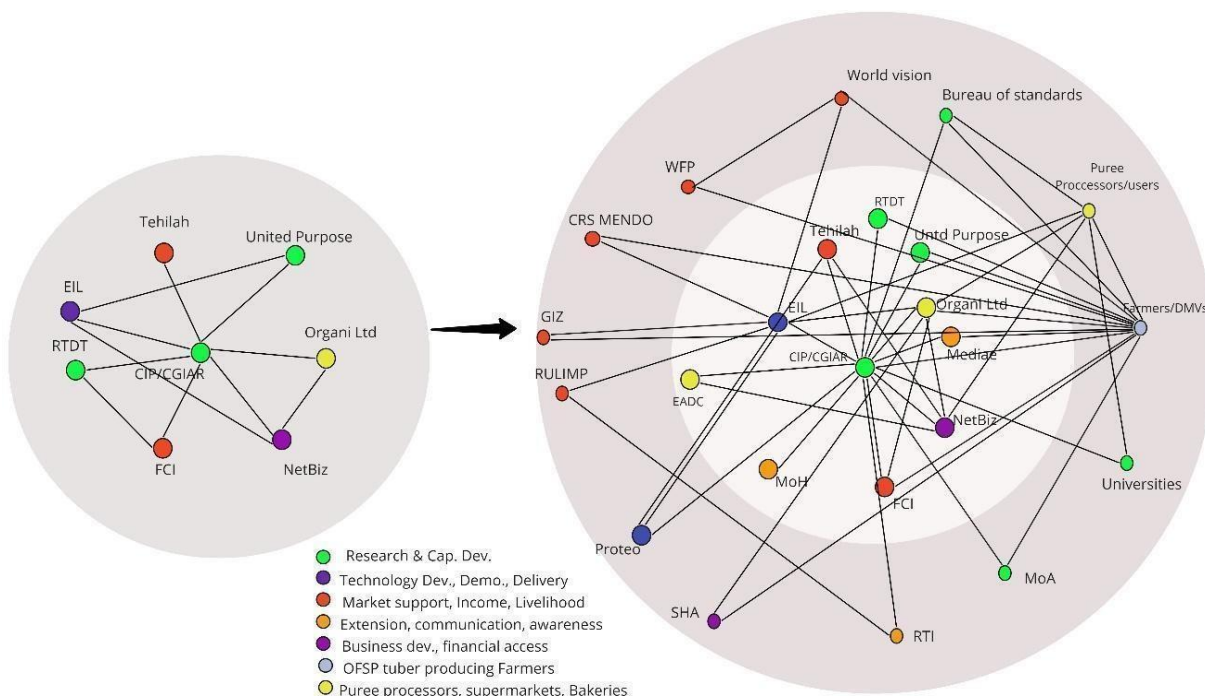


## OFSP Puree case

As part of the Scaling Readiness characterization, the stakeholder profiling and network analysis identified many more stakeholders and potential partners in the different locations. The stakeholder engagement plan in Uganda and Malawi identified 70 stakeholders together with their levels of involvement in the OFSP value chains whereby 9 of them were mentioned as potential partners in the scaling project proposal.

The initial stakeholder engagement plan envisaged the involvement of few potential partners involved in research, extension, market, and capacity development. The diversity of involved stakeholders has broadened (Figure 5) together with the broadening of scaling intervention points or complementary innovations. The first tier of stakeholders consists of the formal partnerships between the project intervention team and direct implementing partners in the different locations. Most of the stakeholders that ended up being implementing partners were already indicated as potential partners from the project proposal stage, a situation already construed as a path-dependency. As a result of the formal partnerships, a second tier of working relations were established among direct implementing partners and other stakeholders to collaboratively work around and beyond the specific planned scaling activities of the scaling project. The stakeholder engagement during the characterization and scaling work plan development opened venues for working relationships among wider stakeholders that have no direct involvement in the scaling project but that would have implications for the scaling of the OFSP Puree in the broader system. For instance, on a scaling work plan meeting GIZ identified an opportunity to partner with EIL to train the informal market to produce OFSP Puree baked and fried food products. RULIMP, an NGO working in fresh OFSP roots market, tasked EIL to link aggregators to the processors and help ensure the level of quality required by the market. Similarly, World Vision, who has been working with farmers in OFSP seed tuber production and is setting up puree processing for SMEs, reached agreement with WFP to link up its processing activities with WFP school-feeding program.

Figure 5: Active stakeholder networks before SR characterization and after scaling strategy design



## EQ2. Based on the above findings, what adaptations can be made to the Scaling Readiness theory of change and its implementation?

This section suggests potential adaptations that can be made to the Scaling Readiness theory of change, on one hand, and the implementation of the approach on the other hand. As can be observed in the next sub-section (Scaling Readiness theory of change), some implementation failures of Scaling Readiness activities (e.g., Reflexive monitoring) are touched upon in the next sub-section—Scaling Readiness implementation.

### Scaling Readiness Theory of Change

As we attempted to ascertain the level of fitness of the Scaling Readiness theory of change, some of the observed inconsistencies between the assumed and manifested causal mechanisms are associated with the theory's tendency to limit emphasis on the potential 'interference' of the broader intervention context on the function and implementation process of the Scaling Readiness approach. For instance, existing partnership trajectory (OFSP Puree case) and broader delivery-focused or technology-oriented scaling practices (Cassava Flash Dryer case) are two important contextual causal forces that notably shaped scaling decision trajectories. Accordingly, this section suggests areas for further reflection and proposes potential modifications to some of the *Hypothesized causal mechanisms*.

***Hypothesized causal mechanism 1:*** 'Capacity development within scaling interventions (HAC1)' will lead to 'higher willingness to invest time and resources in developing, implementing and monitoring evidence-based scaling strategies' (HAO1), through 'a better understanding of the key principles and concepts underlying scaling of innovation' (a)

The Cassava Flash Dryer case showed how a capacity development or shift in knowledge about (systems-oriented) scaling of innovation can facilitate positive change in scaling investments and practices as the project redefines its original scaling intervention and changes its scaling context based on broader system characteristics. Conversely, the eventual shift in scaling strategy and associated investments in the technology component of the package showed how better understanding is not the only causal force that triggers change in scaling practices. A perceived need to respond to existing (institutionalized) practices and associated accountability and/or incentive systems can undermine willingness to invest time and resources in developing, implementing or monitoring a new scaling approach even when the concepts and principles are fairly understood and valued by the intervention team. In this regard, the mechanism required to stimulate '*higher willingness to invest time and resources in developing, implementing and monitoring evidence-based scaling strategies*' goes beyond change in knowledge within the intervention team and calls for a gradual change in expectations in the broader system that interventions operate in.

On the other hand, the OFSP Puree case shed light on how capacity development may not always lead to the type of understanding or change in knowledge it envisages to nurture. Scaling Readiness was mainly appreciated as a stakeholder engagement tool and the intervention team still had unanswered questions on the added value of focusing in *processes* rather than *deliverables*, and the merits of reflexive monitoring with the observed difficulty in reconciling accountability and learning. '*Understanding the key principles and concepts underlying scaling of innovation*' is an evolution towards thinking in systems or a

gradual shift in view on innovation and change processes. In this regard, explicating the Scaling Readiness perspective on *capacity development* and perhaps exploring ways for further facilitation of action-oriented type of learning processes (e.g., in-between reflection sessions on the rationale and implications of the 5 major SR activities) could help support continuous development of capabilities that address the divide in understanding between the assumed and the observed. A suggested modification to the Hypothesized causal mechanism follows:

**Recommended causal mechanism 1:** ‘Action learning and in-between reflection on Scaling Readiness concepts and implementation in scaling interventions (RAC1)’ will lead to ‘higher willingness and ability to invest time and resources in developing, implementing and monitoring evidence-based scaling strategies’ (RAO1), through ‘a better understanding of the key principles and concepts underlying scaling of innovation and a supportive institutional context for adopting systems-based scaling perspective and practices’ (a).

**Hypothesized causal mechanism 2:** ‘Context-specific innovation packages and the assessment of their scaling readiness’ (HAC2), will facilitate ‘the prioritization of bottleneck innovations’ (HAO2), through ‘a greater awareness of interdependencies between core and complementary innovations and their current innovation readiness and use to achieve societal outcomes’ (c).

In the Cassava flash Dryer case, the redefinition of context specific innovation packages and the assessment of their scaling readiness has indeed generated new insight on system transformative innovation components and the identification of context-specific bottleneck innovations. With the OFSP case, the formation of partnerships seemed to have limited prospects to strategically invest around key areas or bottlenecks that might have been more pressing than others. In contexts where there are existing working ties or partnership trajectories that transcend the timeframe of scaling projects, early joint reflection and understanding among the intervention team and key stakeholders on the value of bottleneck prioritization and its implication to scaling investment and partnerships seems imperative. This could create a space to manoeuvre partnerships based on identified weak spots or leverage points in the system for scaling the innovation at hand. In view of these empirical observations, we recommend a modification to the causal assumption;

**Recommended causal mechanism 2:** “Context-specific innovation packages and the assessment of their scaling readiness (RAC2)”, will facilitate “the prioritization of bottleneck innovations’ (RAO2)”, through “a greater awareness of interdependencies between core and complementary innovations, their current innovation readiness and use, and a space to manoeuvre existing partnership trajectories towards scaling investments around key scaling bottlenecks (c)”.

**Hypothesized causal mechanism 3:** ‘The systematic exploration of strategic options to overcome bottleneck innovations by the intervention team (HAC3)’, will result in “better/different decisions regarding proposed investments and actions as part of a draft scaling strategy (HAO3)”, through “a greater/novel awareness of available options for enhancing the scaling readiness of the innovation packages that are realistic within limitations of the scaling intervention (available time, resources) (f)”.

In the Cassava Flash Dryer case, exploration of options to overcome bottlenecks has usefully informed strategic scaling decisions to pull out resources from scaling contexts that could have compromised the

scaling efforts of the intervention. An important area where the reality differed from the assumed (Nigeria, Colombia and Dominican Republic) is the shift in investments to the core innovation component (rather than at package level), which was considered as a way out from the resource (time) dilemma of continuing to invest in system transformative activities that might delay attributable outcomes within the project timeframe. This could also signal that in intervention contexts where the type of (systems) thinking and practice that Scaling Readiness promotes is not yet mainstreamed, interventions could find themselves in a dilemma of continuing committing resources for a new way of strategizing or go back to doing business as usual. The time issue seems particularly relevant for interventions that have relatively short lifetime but had to make major scaling decisions like *Reorient* or *Relocate*. We do not suggest modification to the hypothesized causal mechanism but flag the time issue for supporting flexibility within interventions to better manage the emergent nature of scaling practices and strike a balance between short-term gains and long-term scaling investments.

**Recommended causal mechanism 3:** “The systematic exploration of strategic options to overcome bottleneck innovations by the intervention team (RAC3)”, will result in “better/different decisions regarding proposed investments and actions as part of a draft scaling strategy (RAO3)”, through “a greater/novel awareness of available options for enhancing the scaling readiness of the innovation packages that are realistic within limitations of the scaling intervention (available time, resources) (f)”.

**Hypothesized causal mechanism 4:** “Stakeholder profiling and stakeholder network analysis (HAC4)”, will lead to “better/different decisions regarding selection of partners to overcome the innovation bottlenecks” (HAO4), through “a greater/novel awareness of gaps in the competencies that are required for scaling (d)”.

Existing partnership ties in the OFSP Puree case was an important variable that appeared to have a significant influence in scaling decisions and associated partners’ selection. Even though the stakeholder profiling and network analysis had some contribution in the selection of partners, there was a marked tendency to dwell on existing partnerships. Given the likely strong influence of broader partnership trajectories on scaling decisions, it would be imperative for scaling interventions to reflect on the potential (positive or negative) implications of partnership path-dependencies as part of the design process of scaling strategies. This could create the opportunity for scaling projects to leverage on some path dependencies or break away from others.

**Recommended causal mechanism 4:** “Stakeholder profiling and stakeholder network analysis” (RAC4)’, will lead to “better/different decisions regarding selection of partners to overcome the innovation bottlenecks (RAO4)”, through “a greater awareness of gaps in the competencies that are required for scaling and a reflection on implications of broader organizational ties/partnership trajectories on the selection of partners (d)”.

**Hypothesized casual mechanism 5:** “The development, presentation and facilitated discussion of a systematically underpinned draft scaling strategy (HAC5)”, will lead to “an agreed-upon scaling strategy and scaling action plan that is supported by relevant stakeholders” (HAO5), through “a better understanding of the scaling strategy building blocks and a greater motivation to collaborate towards overlapping objectives (h)”.

The digress in scaling decision trajectory to the Flash Dryer technology component in Nigeria, Colombia and Dominican Republic had a chain effect that perpetuated into the deliberation and agreement processes of the scaling strategy. A bilateral agreement process between the intervention team and individual implementing partners on the development and uptake of the Flash Dryer technology is already a significant implementation detour that left very little room to reflect on the theoretical assumption. On the other hand, the evidence from the OFSP Puree case provides support to the fitness of the hypothesized casual mechanism whereby a rigorous deliberation among broader stakeholders facilitated agreements on the draft scaling workplan.

**Recommended causal mechanism 5:** “The development, presentation and facilitated discussion of a systematically underpinned draft scaling strategy” (RAC5), will lead to “an agreed-upon scaling strategy and scaling action plan that is supported by relevant stakeholders (RAO5)”, through “a better understanding of the scaling strategy building blocks and a greater motivation to collaborate towards overlapping objectives (h)”

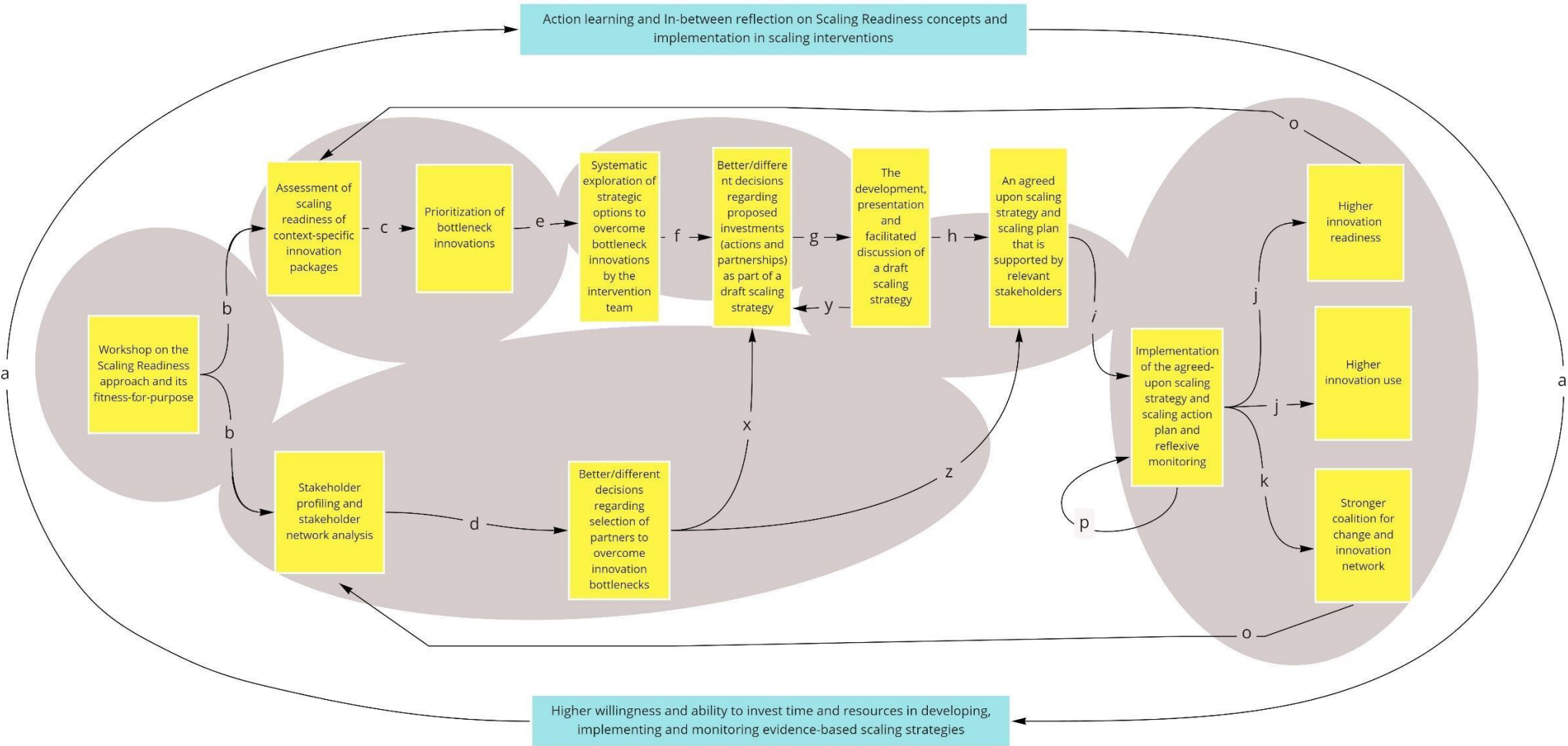
**Hypothesized casual mechanism 6:** “The reflexive monitoring of the implementation of the agreed-upon scaling strategy and scaling action plan (HAC6)”, will lead to “improved scaling performance” (HAO6), through “overcoming bottleneck innovations and greater enthusiasm, energy and synergy in the partnership (j & k)”.

The Cassava Flash Dryer case in DRC lends support to the theoretical causal mechanism by demonstrating how reflexive type of monitoring and learning around the implementation of planned activities can lead to improved scaling performance (*Innovation Readiness*). While we draw on the Cassava Flash Dryer case to claim support for hypothesized casual mechanism, lack of a necessary input (initial scaling readiness levels) and failure to implement the main Activity (reflexive monitoring) left little ground to draw more lessons on the validity of the theoretical assumption from the OFSP case.

**Recommended causal mechanism 6:** “The reflexive monitoring of the implementation of the agreed-upon scaling strategy and scaling action plan (RAC6)”, will lead to “improved scaling performance (RAO6)”, through “overcoming bottleneck innovations and greater enthusiasm, energy and synergy in the partnership (j & k)”.



Figure 6: Modified scaling readiness theory of change diagram and detailed causal mechanisms





## Mechanisms:

- a. A better understanding of the key principles and concepts underlying scaling of innovation, and the rationale and implications of each Scaling Readiness activity
- b. A stronger commitment to invest resources in characterizing scaling intervention, scaling context, innovation packages and stakeholder networks
- c. A greater awareness of interdependencies between core and complementary innovations, their current innovation readiness and use, and a space to manoeuvre existing partnership trajectories towards scaling investments around key scaling bottlenecks
- d. A greater awareness of gaps in the competencies that are required for scaling and a reflection on implications of broader organizational ties/partnership trajectories on the selection of partners
- e. A greater awareness of the context- and objective-specific bottlenecks for scaling and that these need to be addressed
- f. A greater/novel awareness of available strategic options (Substitute, Outsource, Relocate etc.) for overcoming bottlenecks for scaling that are realistic within limitations of the scaling intervention (available time, resources)
- g. A greater awareness on the critical role of partners' involvement, understanding and buy-in of the development, implementation and monitoring of a scaling
- h. A better understanding of the scaling strategy building blocks and a greater motivation to collaborate towards overlapping objectives
- i. Allocation of required resources, time and collaboration as per agreements and action plans
- j. Overcoming bottlenecks
- k. Greater enthusiasm, energy and synergy in the partnership
- x. Informed decisions on which actors or partner organizations are best positioned to overcome bottlenecks for scaling (leveraging on or breaking away from partnership path-dependency)
- y. Stakeholder feedback on the feasibility and desirability of the draft scaling strategy to refining the scaling strategy (may require exploring alternative strategic options)
- z. Better understanding of strategic stakeholders that had not been engaged in the scaling process (still engage them)
- o. New (long) loop of Scaling Readiness assessment starting in Step 1, looking again at (changes in innovation readiness and innovation use of context-specific innovation packages and (changes) in stakeholder coalitions and networks
- p. Short loop monitoring, evaluation and learning during implementation of scaling action plan

## Scaling Readiness implementation

### *On the process of Scaling strategy development*

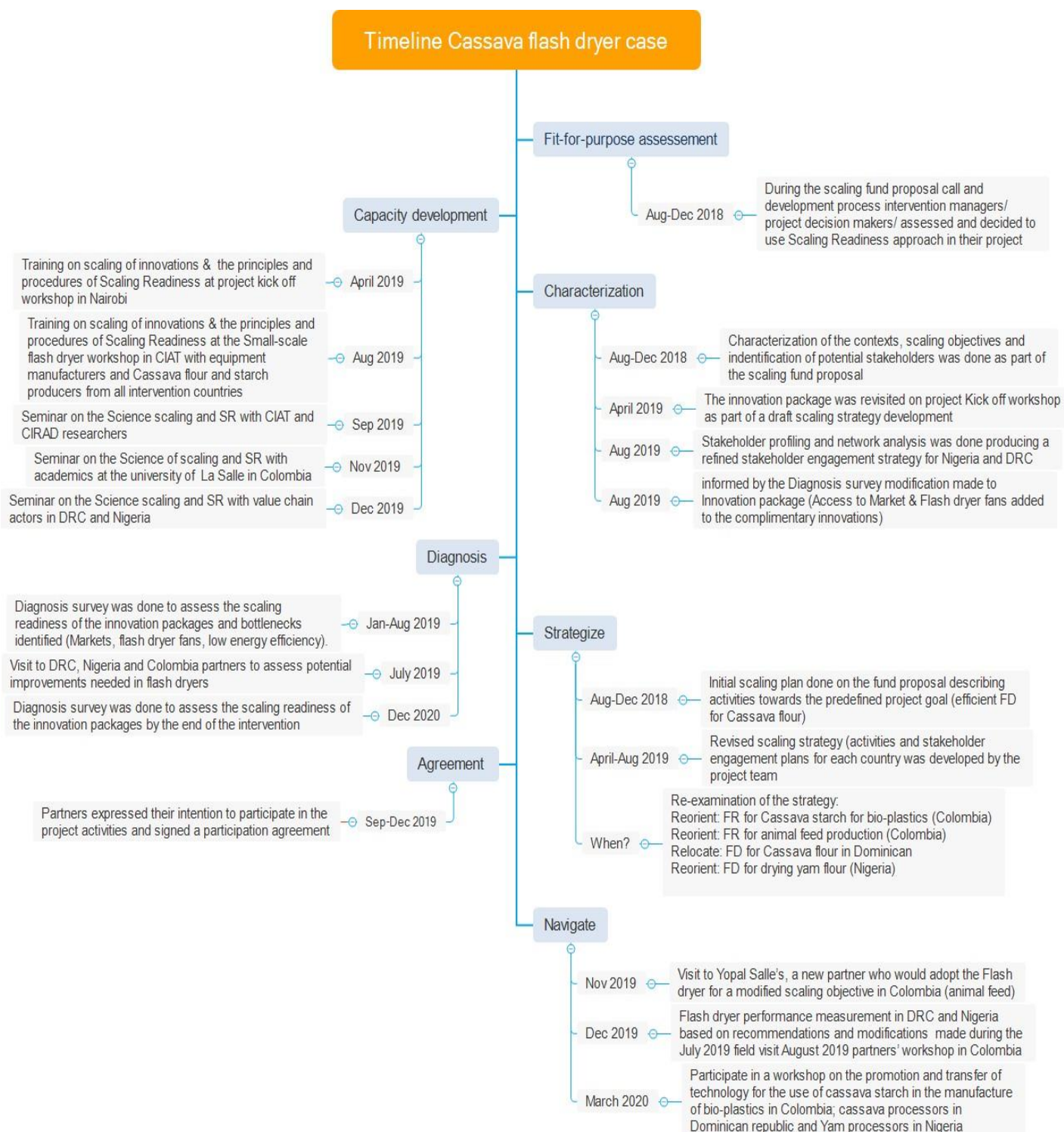
Scaling Readiness aims to support the design of scaling strategies that are realistic, feasible and socially acceptable in a particular context. In this continuous and adaptive process of rethinking and reconfiguring scaling strategies, time seems to come in between the theory and practice of developing an evidence-based scaling strategy. The Cassava Flash Dryer scaling intervention came to the realization that some of the identified bottlenecks (e.g., no cassava flour market in Colombia) were framing conditions that should have been in place to even consider the intervention in the first place. Despite the fact that Scaling Readiness, at a later point in time, helped the intervention to realize the reality on the ground, this decision support could have been more helpful for interventions who function in an ever increasing pressure to deliver outputs or show impact. This highlights the need for exploring ways to implement initial Scaling Readiness activities that are key for the development of evidence-based scaling strategies (characterization and bottleneck identification) around the very early stage of project design or inception. In this way Scaling Readiness can better contribute in shaping scaling practices well in time rather than serving as a tool to morph projects down the line, especially in relatively short projects.

### *On agreement process and navigation towards improved scaling performance*

As much as the Scaling Readiness approach has a methodical implementation procedure around the design of evidence-based scaling strategies, it needs to improve in providing a well thought out guidance at the stakeholder agreement and navigation stage. There might not be a blueprint or a standard recipe on how to catalyze stakeholder consultation, negotiation or learning processes. However, the cases highlight the necessity for innovation facilitation that places sufficient emphasis to the multi-stakeholder engagement that insures partnership coalition formation from the point of view of what is best for scaling without compromising long term relationships of intervention implementers which, in many cases, will continue to operate in the system. In this regard, systematic coaching on facilitation of multi-stakeholder processes as part of the SR capacity building and a loose methodological guidance on reflexive monitoring approaches that takes into account existing organizational M&E system can help intervention teams create the learning space that catalyze and document change processes towards improved scaling performance.

## Annexes

### Annex 1: Timeline of major activities and outcomes in the Cassava Flash Dryer case



## Annex 2: Timeline of major activities and outcomes in OFSP Puree case

