

Strengthening women's and youths' access to innovation support services (ISS): The 24 h' cassava retting case in Cameroon

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ABSTRACT

Strengthening the participation of women and youths in agri-food innovation processes is key to support the development of solutions that meet their needs and that enhance their capacity to drive change in rural areas. We disentangle the 24 hours cassava retting case in Cameroon into three service situations across the ideation, development and dissemination phases. We then assess the intention of inclusion of key innovation support service providers (ISPs) and their approaches, the roles played by women and youths, and the capacity of women and youths to fully benefit from innovation support services (ISS) depending on factors at the personal/agency, relational and structural/environmental levels – an adaptation of the gender-transformative approach (GTA) framework. We find that ISPs wish to target women and youths, but this objective is only assessed in quantitative terms. A deeper understanding of what favors or constrains the capacity to use services and resources of innovative actors at the personal or collective levels would help improve the inclusiveness and quality of ISS, as well as raise awareness of deeper structural changes that are needed at the policy, informal norms and environmental levels. Some women benefit from skills and knowledge, personal traits, as well as from extensive support networks that allow them to overcome the constraining patriarchal norms to innovate. Their capacity to support the active participation of people constrained by e.g. remoteness, health and disability issues or unfavorable gender norms, should be strengthened. This can be supported by extended research and knowledge sharing about innovative solutions found to some specific problems faced by marginalized people across Sub-Saharan Africa. ISPs should also develop, coordinate, and qualitatively assess their activities to help underserved people participate in innovation processes in rural areas.

Keywords: inclusive innovation process, gender-transformative approach; agricultural innovation system, Sub-Saharan Africa

1 Introduction

In Sub-Saharan Africa, the support and promotion of agri-food innovations are considered as necessary to respond to many socio-economic and environmental challenges, such as food insecurity, rural employment and the depletion of natural resources (TAP, 2016; Hendriks et al., 2021). In its Rural Sector Development Strategy/National Agricultural Investment Plan 2020-2030 (SDSR/PNIA), the Cameroonian government encourages a change in the way agricultural research for innovation should be conducted. Instead of the classical top-down and prescriptive approach, „an inclusive and partnering approach“ between producers and researcher-extensionists („équipes recherche-vulgarisation“) is encouraged with the aim to base research topics on users' needs and to increase their level of responsibility (MINADER, 2020, p. 76). Gender is also explicitly mentioned as an important transversal theme of the current SDRS/PNIA (Action 4.5). It is also stated that Cameroonian women represent more than half of the agricultural labor force and that apart from conducting accountability of their participation in major planned actions such as legislations and programs at all levels, 46% of the total planned investments for the 2020-2030 period should be targeted at them. While some investments will benefit both women and men equally, other actions are only directed at women and youths. Two examples are the support for the development of agricultural production for the benefit of rural women and youths and the support for the development and transfer of appropriate technologies for women and youths (MINADER, 2020: 121). This is to become more consistent with the commitments made at the international and regional level as part of the National Gender Policy (NGP) adopted in 2014 (MINADER, 2020, p. 76). The strategy of the Cameroonian government shows that innovations are now conceptualized as multi-actor, interactive processes and that women and youths should increasingly become the target of service providers such as researchers and advisors.

Women and youths have long remained underserved by service providers and it is believed that women in Sub-Saharan Africa have up to two times less access to extension services than men depending on the countries (FAO, 2011; World Bank, 2013; GFRAS, 2013). To innovate interactively requires people interested in pursuing a common goal to gain or to enhance their skills and knowledge, to gain access to appropriate material and financial resources, to be able to take strategic decisions, to coordinate multiple actors, to overcome different types of obstacles such as formal and informal socio-cultural norms as well as natural and structural hinderances. It is thus necessary to develop relationships within the community of innovative actors as well as to reach out to resource and service providers who are willing to respect women's and youths' self-determination and to support them in their endeavors (Leeuwis, 2004; Hoffmann et al., 2009). As a result, scholars have identified a wide range of innovation support services (ISS), besides and beyond extension services (Mathé et al., 2016; Knierim et al., 2017; Faure et al., 2019; Ndah et al., 2020a; Audouin et al., 2021).

The question of how to best match demand and offer of these services has often been raised by scholars. Moreover, there is limited empirical evidence of what challenges both service providers and beneficiaries face. Some authors have highlighted the difficulty for some ISPs such as agricultural advisors to address the needs of some groups who do not clearly express their needs (Birner et al., 2009; Klerkx et al., 2017) or whose needs change along the innovation process (Kilelu, et al., 2014). As regard to women and youths, in particular, they generally lack access to resources, assets, services, technologies, political voice and economic opportunities, as compared to other social groups, and they may have distinctive needs (Hawkins et al., 2018; Elias et al., 2018; FAO and African Union, 2018). The context-specific socio-cultural norms may also shape their capacity to decide for themselves (Petesch et al., 2018) and to actively participate in innovation processes.

Although the conceptualization of innovation processes by scholars has evolved towards a systemic view by using the concept of agricultural innovation systems (AIS), this concept still lacks of preciseness to support 'inclusive' services and to benefit women and youths. The AIS is defined as a *“network of actors, organizations or individuals together with supporting institutions and policies in the agricultural and related sectors that bring existing or new products, processes, and forms of organization into social and economic use, including policies and institutions (formal and informal) which shape the way these actors interact, generate, share and use knowledge as well as jointly learn”* (The World Bank, 2006, pp vi-vii). The concept of AIS thus recognizes that innovation processes are embedded into an environment made of socio-cultural norms, economic opportunities and policies that determine how multiple innovative actors and supporting actors interact. What is missing is namely how this environment shapes the capacity of different types of social groups (e.g. women and youths) to participate in innovation processes. Many scholars have in particular stressed the importance of assessing the gender norms that affect social actors in specific contexts and times (Kingiri, 2013; Pyburn, 2014; Mbo et al., 2016; FAO and African Union, 2018).

It is the aim of this paper to deepen the understanding of what supports or hinders women and youths' participation to agri-food innovation processes in the Cameroonian context and to support research and political decision-making with conceptual work on inclusion in ISS. In the next section, we will thus review theories and methodological concepts from the (inclusive) innovation and gender literature and discuss their appropriateness to (i.) identify who participates in innovation processes and (ii) what attitude ISPs hold regarding the inclusion of underserved groups, as well as to (iii.) assess the capacity of female and young smallholder farmers to access ISS and to actively participate in innovation processes. Empirical findings about gender-specific determinants to innovate in developing countries will also be used to support the argumentation. Based on this critical analysis, a methodological approach will be developed and applied

to the innovation process case “24 hours’ cassava retting” in the Central region of Cameroon (Kamga Boubda, 2020). The objective is to inform ISPs and policy-makers about the potential levies to improve the participation of women and youths to ISS, as well as to support innovation processes that respond to their needs and also drive deeper social and political transformations in favor of more inclusive development.

2 Literature review

Several authors recognize the suitability of the AIS concept to study innovations, but at the same time emphasize the need to ‘engender’ it. Based on a literature review, Mbo et al. (2016) found that women face more difficulties as compared to men when they act as adopters or adapters of innovations, especially in their relations with service providers and with policy makers. Extension service providers, for instance, tend to select better-off participants, so their service beneficiaries are mostly men (Manfre et al., 2013). And policy makers generally lack sensitization for the differentiated needs of men and women, which exacerbates this process (Kabeer, 2000). Supporting this idea, Pyburn (2014) proposes to conduct a gender analysis of “who” exactly benefits from ISS (in terms of gender and age) and “who” provides ISS (also in terms of gender and age) and to scrutinize “how” the ISS are provided and see if they match the needs and preferences of the participants. A study about the profiles of youths agricultural entrepreneurs in Benin shows that it is essential to take their specific aspirations, capacities and needs into consideration, since their educational background and the maturity of their agro-business projects might differ (ACED, 2017), as well as their values and aspirations (Poole et al., 2013). As a consequence of structural inequalities, ISS need to be adapted to women’s structural constraints such as lower levels of education, lower mobility and less time to attend trainings than men (FAO and AU, 2018).

Social norms related to gender and age also largely influence the level of people’s access to ISS and participation to governance processes. For instance, the society may have integrated the fact that men are the households’ representatives and that they should be addressed as such by service providers (Mudege et al., 2017). As age and gender often intersect to reinforce the normative barriers to access ISS and make a decent livelihood, young women and men are particularly vulnerable (Chakravarty et al., 2017; Hawkins et al., 2018). Beyond gender and age other discriminating factors reinforce the exclusion of some people such as their pertaining to some ethnic minority groups or their disability (Ned and Lorenzo, 2016; Anderson et al., 2019). There is thus a need to understand the personal situation and interests of particular social groups at stake in an innovation in order to improve the delivery of ISS to them and also to seize their potential (skills, knowledge, motivation, etc.).

Moreover, innovative actors’ capacity to benefit from appropriate ISS and to actively participate in innovation processes is also influenced by the relationships with actors from other social spheres, their level of agency and their personality traits. A recent empirical study highlights the mentioned inequalities between men and women. The analysis of 336 individual interviews conducted in 19 developing countries among rural women and men recognized in their communities as innovative or entrepreneurial reveals that only 26% of the interviewed women versus 39% of the interviewed men feel that “extension services and other external partners” helped them with their innovation project (Badstue et al., 2018:68). Also for women, the family support is more often cited as an important driver to engage in innovation than for men. Finally, according to Badstue et al. (2018), men and women’s personality traits including grit, hard work, self-confidence, curiosity, and risk-taking are important drivers to innovate. This and similar studies confirm that there is an urgent need for service providers to better target their different clients, in particular women, and to improve services towards this group (Beuchelt and Badstue, 2013; Manfre et al., 2013, Kingiri, 2020).

In order to capture the determinants to innovate and to drive change of individual actors, a range of gender analysis frameworks are in use. Gender analysis looks at the totality of a society to ensure that the interests of all its members – regardless of sex or age – are addressed (Meinzen-Dick et al., 2011, p. 12). Roger’s three domains of individuals’ innovativeness (Rogers, 2010) comprise aspects related to personality traits and behavior patterns, communication behavior and social relations, and socioeconomic characteristics. These three aspects echo to the concept of women empowerment from Kabeer (1999) where “Resources” (including social capital) and “Agency” lead to empowerment. According to Kabeer, agency is “the ability to define one’s goals and act upon them” (Naila Kabeer, 1999). More recently, the gender-transformative approach (GTA) has been promoted (Hillenbrand et al., 2015; Van Eerdewijk et al., 2017; FAO and AU, 2018). The GTA is composed of three interrelated elements: “agency”, “relations” and “structure” (Van Eerdewijk et al., 2017). The structure dimension refers to formal and informal institutions (rules, customs, habits, traditions, recognition and status) that can either constrain or enable actors in realizing their ambitions (Giddens, 1984; Kabeer, 1999). Structure and agency have a catalyst potential, this is to say that acting on both has greater potential to realize gender transformation; furthermore, they influence each other (Giddens, 1984; Kabeer, 1999; Brown and Westaway, 2011; Browne, 2019). In a way, the GTA offers a similar picture to the AIS concept since the two frameworks are systemic: the individuals’ relationship (or social capital) is in both cases an integral part of the system and the overall enabling environment (or structure) affects and is in turn affected by the actors of the system. In the GTA, the individuals’ social relations are analyzed in the family, community, market and state arenas where power imbalances

may exist (Van Eerdewijk et al., 2017). Other authors also mention projects as social spheres of study (Escobar et al., 2017). Complementary to the GTA framework is the notion of “environmental conversion factor” developed by Amartya Sen (1992, 19-21, 26-30, 37-38). The environmental factor refers to physical and built elements such as geographic, climatic, natural, environmental conditions and buildings, roads, means of transportation and communication, respectively. According to Sen, people differ in their ability to make use of a certain type of resource depending on their personal (metabolism, physical condition, skills, personality), social (social capital, support, relationships) or environmental factors. When providing a service (or a resource) to someone, it is therefore necessary to also make sure of his or her ability to convert this service in order to achieve his or her goal. According to the *International classification of functioning, disability and health* of the World Health Organization (WHO, 2001) – in addition to the support and relationships, attitudes and service systems and policies – the notions of natural environment and human-made changes to the environment, participation (autonomy, participation to civic life) and body functions (mental, sensory, voice, speech) are also mentioned as necessary functions or potential impairments faced by people, for instance, to access services and to contribute to social change processes (Ned and Lorenzo, 2016; World Health Organization, 2007).

Finally, social norms and social relationships are both context- and time-specific since they change over time (Diaz and Najjar, 2019, pp 4-5; Kingiri, 2020). The inconvenience of the (engendered) AIS framework for analyzing an innovation process is that it only provides a static picture of a single AIS. We know, however, that in practice innovations – and also empowerment – are processes of network building, social learning, and negotiation (Leeuwis, 2004; Friis-Hansen and Duveskog, 2012; Kilelu, et al., 2014) with possibly intermediary results and changing actors at stake. Consequently, we have to find a way to use the AIS concept in a dynamic manner.

3 Methodology

3.1 Selection and description of the innovation process

Origin of the case study and motivation behind the selection

The study was conducted in the frame of the EU-African Union SERVInnov project (<https://servinnov.cirad.fr/>) which means “Strengthening innovation support services (ISS) to enhance innovations for sustainable food production, ensuring the well-being of rural populations and reducing environmental degradation and resource depletion”. As part of SERVInnov, around twenty currently on-going innovation process case studies in Burkina Faso, Madagascar and Cameroon were identified and selected by the project consortium. The “24 hours’ cassava retting” case in Cameroon has been selected to gather empirical evidence of the social and gender dynamics at stake across an innovation process. Cassava retting is one step towards cassava fermentation which is necessary to process cassava into a great variety of food products such as fufu (Odom et al., 2012; Darman et al., 2015). We selected this case study, because a) cassava (*Manihot esculenta Crantz*) is an important subsistence and cash crop in Sub-Saharan Africa and in all the regions of Cameroon, and b) in Cameroon women represent 90% of the cassava producers (Emmanuel, 2013) and are mostly responsible for the post-harvest phase which is a tedious process that is sometimes undertaken with the support of some young men and women (Moma, 2014), c) there are many potential environmental and socio-economic benefits to expect from a more effective processing of cassava such as the increase of the conservation length, a better nutritive value and less damages to the environment (James et al., 2013). Cassava is a perishable crop and in Sub-Saharan Africa, food losses in the root and tuber sector come second after post-harvest losses of fruits and vegetables (45% and 50% of total food losses respectively) (FAO and AUC, 2020). Improving post-harvesting and processing activities of cassava can thus potentially increase the availability and quality of food products and raise producers’ income.

Context and location of the case study

The innovation process is taking place in the locality of Ngo’olbibanda in the Central region of Cameroon. Cassava is one of the main staple crops produced in that region. The innovation process was initiated by the project “*Sustainable cassava production in Central Africa and market integration*” piloted by the international agricultural research institution *Pôle Régional de Recherche Appliquée au Développement des Systèmes Agricoles d’Afrique Centrale* (PRASAC) and funded by the European Union from 2010-2015 and by FODECC from 2016-2017. A second phase (2017) of the initiative was implemented within the frame of the “*Valorization and diffusion of the peasant starter in Cameroon*” project, led by the *Centre Technique de Coopération Agricole* (CTA), the technical centre for agricultural cooperation. Finally, a third project “*Manioc 21*” (2018-2020) was funded by CTA too and carried out by the *Plateforme Régionale des Organisations Paysannes d’Afrique Centrale* (PROPAC), a regional platform of peasant organizations in Central Africa.

Method for data collection

For the tracking of the innovation process trajectory, in-depth interviews were conducted with 5 ISS beneficiaries (the leaders of 5 cassava farmer cooperatives) and 7 innovation support service providers (ISPs) (advisors, researchers, traders etc. etc.) (Kamga Boubda, 2020). For this purpose, a questionnaire had been developed with open-ended and closed questions. The themes of the interviews included information to characterize the service providers and beneficiaries, questions to characterize their roles, the ISS activities, the influence of the enabling environment on the service delivery, as well as specific questions about the inclusion of women, youths and disabled people, such as the intention of ISPs to purposely include them or not in the innovation process and the level of participation of beneficiaries in the co-definition of ISS activities.

Analysis framework for the innovation process

The study case is framed as an innovation, with the term ‘innovation’ designating something that constitutes a lasting change for the better within a social system in a specific geographical context (Blake and Hanson, 2005). Furthermore, an innovation is understood as a process over time, which can be conceptualized as a time line or trajectory dissected into important events (Eastwood et al., 2017). These events are conceptualized as ‘service situations’, composed of a) one or several service providers, b) one or several ISS beneficiaries, c) the ISS that are provided to solve the problem of the innovation carrier at one point of time and, d) the enabling environment which includes the socio-economic, institutional, and governance dimensions (Ndah et al., 2020b; Toillier et al., 2021) that influence how knowledge and power are shared along the process of innovation and that determine *in fine* the faith of the innovation. In our analysis of the environment, we stress the presence of projects and the intention of inclusion formulated by the actors. The ISS typology used is based on the typology previously identified in European agri-food systems (Mathé et al., 2016; Knierim et al., 2017; Faure et al., 2019), namely: ‘knowledge awareness and exchange’, ‘capacity building’, ‘advisory, consultancy and backstopping’, ‘enhancing access to resources’, ‘demand articulation’, ‘networking’, ‘facilitation and brokerage’, and ‘institutional support for niche experiments and scaling-up’. An innovation process is composed of many service situations. In the findings section, we only present one major service situation for each of the major innovation phases.

3.2 Methodology for the gender analysis

Data collection

Most of the data used in the gender analysis originate from the in-depth interviews conducted for the elaboration of the innovation trajectory (previous section). They were completed by observations during two field visits. Some elements originate from an in-depth interview conducted with “Maman Douala”, one of the actors of the innovation trajectory, on the 25th of May 2019 in the village of Ngo’olbibanda (Kamga Boubda, 2019, p. 126). This interview took place within the frame of a study whose general objective was to characterize ISS and their providers (ISP) within the cassava sector, as well as to identify the problems faced by ISPs (n=29) in the Central, Littoral and Southern region of Cameroon. This study provided some general information about the structural elements which may positively or negatively impact innovation carriers in the cassava sector. A review of some scientific and grey literature (consultants’ reports, official documents) and research into the OECD’s databases helped us complement information about the “structure”.

Criteria of selection of specific innovative actors

The selection of the actors on which a gender analysis is performed (n=2) is based on the following considerations: a) the actors are smallholder farmers; b) the actors play major roles in the innovation process either as beneficiaries of ISS or as ISPs.

Conceptual framework for data analysis

The gender-transformative approach (GTA) has been selected to analyze qualitative data obtained from two ISS beneficiaries. This choice is motivated by the need to reflect three possible sources of difficulties at the individual, social, and structure levels. For more clarity, we name the three categories: (i) personal resources and agency, (ii) social relations, and (iii) structure and environment. We base the definitions of those categories on the ones from Hillenbrand et al. (2015), Kabeer (1999) and Sen (1992) as follow:

(i) Personal (or organizational) resources and agency: Individual or collective knowledge, experience and skills, attitudes, personal traits, critical reflection of an agent, as well as assets, actions and services that an agent benefit from. The personal resources also include someone’s body functions (mental, physical, voice and speech...) and impairments. The agency is the capacity of an agent to set goals for itself and to mobilize personal or external resources (including social capital) to achieve them. It includes the capacity to make choices and to take decisions.

(ii) Social relations: Support, cooperation, co-optation, competition or negotiation dynamics embedded within relationships between people in the home, market, community, groups and organizations. Social relations can also be defined as internal or external to one's community and in terms of organizational type (public, private, farmer-based organization, NGO, informal at the local, national, regional or international level).

(iii) Structure and environment: The structure refers to formal (policies, written rules) or informal norms (rules, customs, habits, traditions, practices, recognition and status) that can either constrain or enable actors in realizing their ambitions (Giddens, 1984; Kabee, 1999). These norms are often internalized and translated into the practices and attitudes of institutions at stake in the agricultural innovation systems. They may be internalized by individuals, their family members, the economic actors, their community, the project members, the service providers or public authorities. They can include local, national and international elements. The environment is composed of natural elements (e.g. geographic, climatic, natural, environmental conditions) and built elements (e.g. buildings, roads, means of transportation and communication). Both norms and environmental elements may vary across contexts and over time.

For each of the broad dimensions of a GTA, numerous indicators can be used to measure the changes that are needed. We reviewed the list of indicators based on a literature review from Hillenbrand et al. (2015: 23-46) and we proceeded in a deductive way in order to mention as many indicators as possible based on our state of knowledge. The reviewed indicators comprise the control over income and labor (30 indicators), control over assets (7 indicators), control over land (13 indicators), control over others, mobility (10 indicators), control over the agenda (11 indicators), knowledge awareness and conscientization, self-efficacy, aspirations and internal beliefs (14 indicators), collective action and group strength (18 indicators), social capital, networks and solidarity (10 indicators), and household decision-making (12 indicators). We then discussed which indicators could be backed-up by some evidence from both the interviews and the observations and selected only these ones.

4 Findings

The findings consist of a description of the innovation process and especially of three selected service situations (3.1), and of the gender analysis of some selected key actors in these service situations using the gender-transformative approach (GTA) conceptual framework (3.2).

4.1 The key service situations across the innovation process and the intention of inclusion

The innovation trajectory is composed of the following activities across the different innovation phases:

- **At the ideation phase (2009-2017):** i. (2009-2010) Study on the determination of the microbial flora in cassava pods (University of Yaounde), ii. (2012) Study on the use of cassava chips as fermentation accelerator (University of Yaounde), iii. (2012-2013) Field visits in Balamba to identify the needs of women cassava producers and processors, iv. (2013) Collaboration between the University of Yaounde and the National School of Agro-industrial Sciences (ENSAI) on the possibilities to improve the peasant starter; v. (2013-2016) Funding of a PhD thesis to develop an optimized starter and its utilization in the field; vi. (2016) Production of technical leaflets and presentation of the starter at the cassava forum in Yaounde; vii. Search for funding for the experimentation in the field.
- **At the development phase (2017-2018):** i. Identification of the beneficiary cooperative network with the umbrella organization of cassava cooperatives PROPAC; ii. Organization of exchange workshops with women leaders to develop the technology in order to take into consideration the practices of women processors and the context of the field; iii. Selection of 25 female leaders to be trained in the production, use and conservation of the starter; iv. Co-development of a new protocol for the use of the starter optimized in the farming environment.
- **At the dissemination phase (2018-2020):** i. Secondary training of women and youth members of cooperatives by leaders and within the framework of the Chef project; ii. Participation in sector workshops (PROPAC, PRASAC) in which extensive communication and sensitization on the starter takes place (distribution of technical sheets, intervention in local media); iii. In the case of the cassava project 21: selection of beneficiaries, starter training, support in equipment and financial means (90% of the cost of the material) following the expression of needs by the cooperatives and a diagnostic visit in collaboration with suppliers (PROPAC and IITA), coaching on good hygiene practices standards and labeling, and marketing and commercialization. 2,283 women and 547 youth were reached by the 21 project and 3,465 women and youth in the Central Region by the CTA.

The selected service situations below (Table 1) belong to the ideation, the development and the dissemination phases of the 24 hours' cassava retting innovation process. Each of them involves different actors who provide innovation

support services (ISS) to some selected ISS beneficiaries with various intentions of inclusion. Maman Douala is one of the cooperative leaders who participated in an exchange workshop between the scientist and women leaders. She played a prominent role for the development of the innovation since during this workshop she used the new cassava starter culture developed in the lab by the PhD student and consequently shared with him her practical knowledge of cassava fermentation. Her engagement significantly accelerated the fermentation process. The interaction of the ISS beneficiaries and providers is shaped by the enabling environment. The outcomes of these interactions for the innovation process are the mentioned 'results' that shape the direction of the innovation.

Table 1

Selected service situations and actors at various innovation phases and their results for the innovation trajectory

	Service situation 1	Service situation 2	Service situation 3
Innovation phase	Ideation	Development	Dissemination
Innovation support services (ISS)	Funding, institutional and material support for a PhD thesis to develop a fermentation starter culture	Organization of exchange workshops with women leaders for field experimentation	Secondary training of their own cooperative members by the 25 trained cooperative leaders
Selected providers	A Professor, expert of cassava retting, PRASAC, the University of Yaoundé	The Professor, the PhD student, CTA project staff, PROPAC	Maman Douala, one of the 25 cooperative leaders, the Professor, the PhD student
Selected beneficiaries	A PhD student (young male)	Maman Douala, one of the 25 cooperative leaders	Women and youth members of the SOCOPMAPA cassava cooperative in Ngo'olbibanda
Intention of inclusion	No	Yes (women are targeted by CTA and PROPAC)	Yes (inclusion of some young and poor women in the cooperative)
Enabling environment	The "Sustainable cassava production in Central Africa and market integration" EU-funded Project (2010-2015) led by PRASAC	The "Valorization and diffusion of the peasant starter in Cameroon" project (2017-2018), led by CTA	
Results	The cassava retting process takes 48 hours under lab conditions The fermented cassava products achieve a better quality	The cassava retting process takes only 24 hours under field conditions (optimized starter culture)	The cooperative members are trained to the production, conservation and use of the optimized starter culture

4.2 Gender analysis of selected key actors

As described previously in the methodology, smallholder farmers who play significant roles in the innovation process were selected in order to perform a gender analysis. These actors (colored in Table 1) are the cooperative head, "Maman Douala" and the group of cassava producers belonging to the cooperative headed by Maman Douala (Table 2), who play significant roles for the innovation trajectory in the second and third service situations.

The findings presented in the table below are a selection of indicators for the 'personal (or organizational) resources and agency', the 'social relations' and the 'structure and environment' domains of analysis for each of these two actors.

Maman Douala, the leader of the cassava women cooperative, shares some similarities with other cassava producers: she is a smallholder farmer with a low literacy level. She has, however, some leadership skills and personal traits which differentiate her from the others. Most importantly, she has past experiences as an innovator (cassava flour, cassava leaf dye, use of old cuttings as fertilizer) and she receives support at the personal and extra-community levels from diverse types of actors. Maman Doula represents the cooperative members toward external partners and also discusses with the members' spouses in order to encourage the participation of women to economic activities. When interviewed, she strongly criticized the discriminations that women generally face in her country.

Table 2

Gender analysis of small-scale cassava processors in Cameroon with regard to their access to ISS

	Organizational or individual resources and agency	Social relations	Structure and environment
Gender analysis of the cooperative head, Maman Douala	<ul style="list-style-type: none"> • Leadership skills • Long experience in the cassava sector (since 1999) • Innovating experience (processing of cassava and the re-use of post-harvest losses as fertilizer and cassava leaves as dye) • Low level of literacy and education • Good knowledge of cultural, legal and political processes, as well as potential for structural change • Assertive communication and comfort with speaking out in public • Capacity to negotiate (in markets) and strong implication in community decision-making processes • Capacity to induce change in some socio-cultural norms at the household level 	<ul style="list-style-type: none"> • Spouse support to freely undertake professional activities • Strong support network up to the national level and abroad among officials, leaders and development actors (active participation in projects, membership in several national and international umbrella organizations) 	<p>Formal norms (at the country level):</p> <ul style="list-style-type: none"> • Very high gender-based discriminations (GID-DB 2019), especially: women's lower right to own land and non-land assets (OECD, 2019a) • Women are not legally recognized as the household head (except non-married, divorced or widows) (OECD, 2019a) • Planned policy reforms in favor of women and youths' access to land tenure, appropriate technologies, applied research, advisory services and support to entrepreneurship (SDSR/PNIA 2020-2030) <p>Informal norms:</p> <ul style="list-style-type: none"> • Strong patriarchal socio-cultural norms in the country that usually limit women's economic role (e.g. non-recognition as household's head, reproductive role and numerous non-paid tasks, lower land tenure and financial services access than men) • Acceptation that women earn economic incomes and occupy leadership roles in this sector
Gender analysis of the women cooperative members	<ul style="list-style-type: none"> • Actions are initiated by the women farmers' cooperative to improve their work conditions and profit (e.g. marketing) • Women expand their ambitions • Women benefit from some economic autonomy at the individual level • Women collectively contribute to the funding of the cooperative and to the diversity of funding sources (membership fees, tontine) • The leadership is effective • Some young and poor women are included (inclusivity) • Men are poorly represented in the cassava value chain 	<ul style="list-style-type: none"> • Women receive support from their leader to overcome some constraining socio-cultural norms to allow them to attend some project/professional activities • Women's interests are supported to a certain extent by some external actors (projects) • Women hire some family and extra-family labor to help them in some activities 	<ul style="list-style-type: none"> • Recognition of women as dominant in number and skilled labor in the cassava production and processing (Kamga 2020) • Physical activities performed by family or hired labor (men, children) (Moma, 2014) • It is admitted that both women and men become members of cassava cooperatives, but only a limited number of men participate <p>Environmental conversion factors:</p> <ul style="list-style-type: none"> • Poor and young people only have access to some small or not highly productive fields • Some people live in remote areas and do not easily have access to markets and service providers, especially in the rainy season due to bad road conditions

The women cooperative members initiate collective actions to improve their situation. They are well-organized and benefit from the support of their leader and of some external projects. This group is rather homogenous in terms of gender (mostly women), but heterogeneous in terms of age (it includes youths). They are able to hire some family and extra-family labor (men) to help them in difficult, physical activities during cassava production.

5 Discussion

The study of the 24 hours cassava retting case in Cameroon reveals the intention and practices of inclusion by different ISPs. It also illustrates that the access to ISS is enabled or constrained by aspects observed at the personal (Maman Douala, cooperative head) or organizational (cooperative members) level across three domains: the resource and agency domain, the relations domain for various social spheres, and the structure and environment domain. We first

discuss these aspects for each innovation phase and then make some recommendations about the different roles and approaches that ISPs could adopt in order to better address the needs of underserved people such as women and youths. We also reflect about the impacts of ISS activities and innovation processes on inclusive development as a whole.

We find that decisions made at the initiation stage by the research institutions (ENSAI, University of Yaoundé) to enhance cassava processing already determined whether the innovation would address the problems of relatively marginalized people or not. The decision of developing a cassava starter culture that would accelerate the fermentation time was based on the observation that this process could take several days through traditional practices and that improving cassava retting would be beneficial to women and youths who represent the large majority of the labor force for this activity. This approach matches the Cameroonian strategic orientation since it supports the development and transfer of appropriate technologies for women and youths (MINADER, 2020, p. 121). By targeting the cassava sub-sector that is already dominated by women it is confronted with less resistance than in other agricultural value chains. There is however an absence of intention to target disabled people despite a decree that should ease the supply of technical support and credits targeted at people holding a disability card (Yang, 2018). At the initiation phase, there is no intention to purposely hire a female researcher in Cameroon in order to increase their access to such positions, although this is also a way to promote the inclusion of young women into innovation processes.

The selection of cassava cooperatives to participate in the project by the umbrella organization PROPAC was also decisive about who will benefit from ISS or not. Semi-structured interviews conducted for the purpose of ISP mapping and characterization have provided the information that interventions from research institutions are sometimes redundant and that the same communities often attract ISPs (Kamga Boubda, 2019, pp 131-136). We thus recommend ISPs to deepen their knowledge of the state of marginalization of cooperatives or of their members in order to support inclusive innovations that are both *for* the marginalized and developed *by* them (Andersen and Johnson, 2015). The evaluation of inclusion should then be done in a more qualitative way instead of simply quantifying the number of women and youths reached by the project. This would give more value to the efforts of inclusion, given the fact that the cassava sub-sector is dominated by women and the notion of youths is very vague.

At the development phase, the cooperative leaders are the beneficiaries of ISS which aim at building up their personal skills and knowledge about how to produce, use and conserve the cassava starter culture developed in the lab. This phase is aimed at experimenting its implementation under field conditions using women's know-how and the local equipment (basins, baskets, etc.). The researchers had already observed that the practices differ a lot among the processors, and Maman Douala's retting practices stood out. Moreover, her personality, the support of her spouse to allow her to take responsibilities in the cassava sector and her exposure to external actors – as described in the gender analysis – allowed her to freely share her knowledge and communicate with the project staff. This confirms that personal traits and relations at the family and extra-community levels are important drivers to innovate in southern countries (Badstue et al., 2018). This also shows that building people's agency and level of self-confidence should be a prerequisite to the organization of exchange workshops aimed at sharing knowledge between scientists and (marginalized) practitioners.

The approach of selecting cooperative heads for the secondary training was effective for overcoming the socio-cultural distance between scientists and the practitioners in the villages, as well as for using their existing networks to influence locally. This strategy has been used in other contexts to disseminate innovations (Dolinska and d'Aquino, 2016). In our case, the secondary training of the cooperative members is jointly done by Maman Douala, the Professor and the PhD student. This is the occasion to prolongate the knowledge exchange among them and to jointly develop training methods towards the rest of the cooperative members. The three ISPs could also exchange and agree upon inclusive approaches and objectives: who is to target; how can the active participation of all and the benefits for all be reinforced; how can the needs of all be captured and the voice of all heard? For Ned and Lorenzo (2016) "There is a need for service providers to take a holistic approach, considering all aspects of a person's lived experiences and their context, such as the individual needs related to their impairment, personal and environmental factors, as well as activity and participation restrictions that may impinge on their rights as active citizens. Being inclusive then refers to ensuring that the voice of each person is part of the process of change."

In addition to the transmission of technical knowledge to the cooperative members, cooperative leaders should also learn how to tactfully and thoroughly address hinderances linked to socio-cultural norms and to conduct participatory decision-making processes related to the innovation. In the dissemination phase, we have observed that Maman Douala had to convince the spouse of several cooperative members of the importance of the trainings for their wives. This reveals that individuals at the local level are a key to lifting socio-cultural barriers that stop women from participating in trainings and benefiting from advanced innovations and that this role should be acknowledged and supported through the funding and delivery of appropriate trainings for the trainers. Deeper changes in people's mindset about gendered roles could be promoted by specific interventions and activities which often require long-term interventions (Friis-Hansen & Duveskog, 2012).

Finally, the governance approach and decision-making rules of the cooperatives could be adapted in order to enhance the participation of all, not only during ISS activities, but also during decision-making processes around the innovation in order to seize the specific immediate needs and long-term aspirations of all.

In the studied case a number of people were completely excluded from service delivery due to temporary or life-long handicaps and diseases (e.g. maternity or aging) or due to physical obstacles such as remoteness of their home or the lack of good infrastructures. As such conditions and (temporary) characteristics are widely prevailing (World Health Organization, 2021), we recommend that addressing the needs of these people requires firstly a more refined assessment of their difficulties, and secondly, the adaptation of existing ISS or even the development of some social and technical innovations.

We have discussed the intention of inclusion and inclusive approaches of ISPs. Inclusion can also be assessed in terms of impact on the end-users (Heeks et al., 2013). The cassava processors benefit from a better-quality end-product and save time. In order to assess the inclusive level of the innovation in terms of impact on its beneficiaries, it could be appropriate to evaluate whether time-saving has resulted in improved well-being and tangible resources for all. It could also be interesting to observe whether – during the process of innovation – men, women and young people have enlarged the scope of what is socially acceptable for them to do and to be or not. It is also possible to assess how the attitudes towards the service beneficiaries of their family members, other community members and economic actors of the cassava value chain have changed. It is thus recommended to adapt project evaluation frameworks in order to assess the changes that have occurred at the personal, family, community and market levels.

The different ISPs (public or private organizations, civil society, informal actors) could make use of the GTA framework in order to reflect about the different obstacles faced by potential beneficiaries of ISS activities and to contribute to the direction of innovations by openly sharing their concerns and aspirations. They could subsequently reflect about their positioning to support innovations and inclusive processes. In the case study we have identified that the ISPs intervene to overcome difficulties at the personal resources and relations levels, but – to our knowledge – not at the structural or environmental levels (e.g. improving youths' and women's access to good fields). Social transformations also require local communities to voice out their needs and to influence politics and policies (Rao and Kelleher, 2005, p. 60). NGOs or other civil society organizations together with researchers who are often seen as instrumental to catalyze local demand and promote social and political change could control whether the announced reforms to women's and youths' access to land tenure have been realized and inform them about this right. More generally, it is important that ISPs claim for more inclusive legal frameworks that eliminate discriminations against women and youths or that they find allies to do so. As such, the GTA analysis framework is useful to support deeper social and political transformations that extend beyond the innovation and that create the conditions of a more inclusive development.

6 Conclusion

We found that women and youths in the Cameroonian 24 hours' cassava retting case study are constrained by lower levels of education and resource endowment than men, by impingement of gender norms that stop some of them participating in ISS activities and by policies that do not recognize them as family heads. Moreover, some people face issues of remoteness, bad road infrastructures and health or disability issues that call for service adaptation. At the same time, certain women individually or collectively overcome these difficulties thanks to their membership in the cooperative and thanks to some personal and relational advantages. We observe that the role of the cooperative leader is crucial to obtain women's spouse support and to bridge knowledge between the research and practice spheres. Strengthening women's and youths' access to appropriate innovation support services (ISS) across an innovation process requires first understanding which roles they successively play either as service beneficiary or as innovation support service provider (ISP). Our case study exemplifies the fact that reducing inclusive approaches to the target of women and youths as general socio-cultural categories is insufficient. Instead, a finer analysis of what drives or hinders people to participate in innovation processes can help: i) targeting the most excluded people, ii) supplying adapted clusters of ISS that compensate the difficulties of specific people and addressing problems in a holistic way, iii) making use of women's and youths' strengths and active engagement, iv) ISPs positioning themselves in relation to the inclusion efforts they can make (e.g. public authorities will address structural and environmental challenges, while grassroots actors will provide resources and services and make some lobbying) and improving their coordination. The adapted GTA framework that we complemented with the 'environment conversion factor' can be adopted by ISPs in order to assess the personal/agency, relational, structural and environmental domains of some key individuals or groups at several times of the innovation. This process takes into account the changes that occur over time and that are desirable, such as the increased level of responsibilities and autonomy of some stakeholders. The impact of inclusion on innovative people's empowerment and wellbeing is therefore to be evaluated in order to communicate qualitatively about inclusive outcomes of projects. ISPs could also reflect about the development of their inclusive strategies and capacities to support inclusive innovation processes. Regardless of the service that they provide, the agents should bear in mind the potential causes of inequalities among their beneficiaries and try to deliver appropriate ISS to all. More systematic

research should be undertaken in rural Africa about hinderances to access ISS at the personal, relational, structural and environmental levels, as well as the solutions found by the different actors at stake for overcoming them.

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