

Article

# Platform, Participation, and Power: How Dominant and Minority Stakeholders Shape Agricultural Innovation

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**Abstract:** Within agricultural innovation systems (AIS), various stakeholder groups inevitably interpret ‘innovation’ from their own vantage point of privilege and power. In rural developing areas where small-scale and subsistence farming systems support livelihoods, dominant policy actors often focus heavily on participatory modernization and commercialization initiatives to enhance productivity, access, and quality. However, existing social hierarchies may undermine the potential of such initiatives to promote inclusive and sustainable farmer-driven innovation. Focusing on the chronically food insecure smallholder agricultural systems operating in Yatta Sub-county, Eastern Kenya, this paper explores how power dynamics between stakeholders can influence, and can be influenced by, participatory agricultural innovation initiatives. Findings suggest that there are often significant disparities in access to, and control over, platform resources between smallholder farmers and other stakeholder groups, resulting in large asymmetries. We discuss how these power dynamics may increase the risk of agricultural intervention, further marginalizing already disempowered groups and reinforcing power hierarchies to the detriment of smallholders. This study highlights the need for a deeper understanding of the institutional contexts that facilitate and maintain relationships of power within agricultural innovation systems, as well as the complexities associated with promoting transformational agricultural innovation.

**Keywords:** Sub-Saharan Africa; rural livelihoods; subsistence; smallholders; sustainable food security; participatory development; sustainable agriculture; community engagement

## 1. Introduction

Agricultural innovation is a complex and dynamic process, involving multiple actors situated within diverse organizational, institutional, and social contexts [1,2]. Within the agricultural innovation systems (AIS) framework, innovation is the process and outcome of putting any information into economic, environmental, or social use, including the integration of new and existing information [3]. AIS approaches have developed from realizations that technological solutions often need to be specific to a given environment [4] and that innovation stems from multiple sources [5], requiring systems that foster partnerships [6] and reflexive institutions which allow for learning and innovation [7,8]. A particular area of focus is how stakeholders (also referred to as actors) interact with each other and their surroundings to co-create and direct innovation [2]. This has led to the identification of “innovation intermediaries” or “brokers”, that can facilitate negotiations across hierarchies and help

break down barriers to the participation of small-scale farmers in platforms [9–13]. Agricultural innovation platforms have been defined as stakeholder linkages that are purposively created and maintained to address specific agricultural innovation challenges or opportunities [11,14–17] within their institutional context [18]. Using innovation platforms to strengthen the social networks that link farmers to diverse stakeholders in the agri-food system has the potential to facilitate the identification of collective interests and needs [11], promote greater trust and co-operation [7], and expose individuals to resources and adaptation strategies beyond the realm of their own experience [19,20]. Within smallholder and subsistence farming systems, innovation platforms are generally created through agricultural development initiatives, utilizing participatory and inclusive approaches in order to develop locally appropriate technologies [21] and ensure the equitable participation of all relevant stakeholder groups [22,23].

Community-based interventions inherently entail trade-offs between stakeholder groups with varying degrees of power and interest [24], an issue often not well addressed in practice [1,9,24–26]. According to Cullen et al. [1], existing power hierarchies may cause innovation platforms to fall short of their claims of inclusive, farmer-driven innovation, unless thorough consideration is given to issues of power [27]. The participation of smallholder farmers in research and development initiatives has long held the promise of improving development outcomes, including sustainably improving food security and reducing rural poverty, through the inclusion and valuing of local knowledge [28]. Participatory approaches have spread rapidly and can now be considered a requirement for smallholder-related research and development in many contexts [29]. The proliferation of participatory methods, including Participatory Rural Appraisal (PRA) [30], Farmer Field Schools (FFSs) [31], and a range of other approaches, has generated many definitions of participation that vary widely, both in theory and in practice [32–37]. However, as noted by Neef and Neubert (2011) [38], effective participation often remains ill-defined amidst a mentality of, “the more participation the better”, where participation is seen as occurring along a gradient of low to high.

Critics of participatory approaches that are designed to increase the efficiency and effectiveness of agricultural development have asserted that insufficient attention to issues of power can lead to participation that reinforces existing power hierarchies, further oppressing and excluding marginalized groups [39,40]. Complex bureaucratic institutions that maintain rigid hierarchies [41] and affect stakeholders’ abilities to negotiate and to build reflexive institutions [42] can aid stakeholders with the power to employ participation to their advantage [43]. In this way, participation can be used to enforce policy goals which do not necessarily align well with the goals of the participating smallholder farmers [44]. For example, Williams [45] pointed to the use of emancipation language within participation rhetoric, that effectively incorporates marginalized groups into modernization and commercialization projects which serve the dominant national agenda, rather than community objectives or any type of genuine empowerment. This type of top-down control, while cloaked in the language of participation, may lead to short-term gains in certain development indicators [46] at the expense of longer-term objectives [47]. The unanswered question for many agricultural innovation initiatives in smallholder and subsistence farming systems internationally is the extent to which empowerment has been prioritized in the creation of platforms, and to what effect [29].

In this paper, we present the results of an exploratory stakeholder analysis conducted in a chronically food insecure smallholder agricultural region of Eastern Kenya to better understand how power dynamics between stakeholders can influence, and have been influenced by, participatory agricultural innovation initiatives.

## 2. Research Context

Fostering innovation within the agricultural sector is a key priority for the Government of Kenya (GoK) and is directly tied to the government’s role in meeting the food and economic security challenges faced by its citizens [48,49]. The central role of agriculture in the economy is emphasized in both the Economic Recovery Strategy for Wealth and Employment Creation (ERS) (2003) [50] and

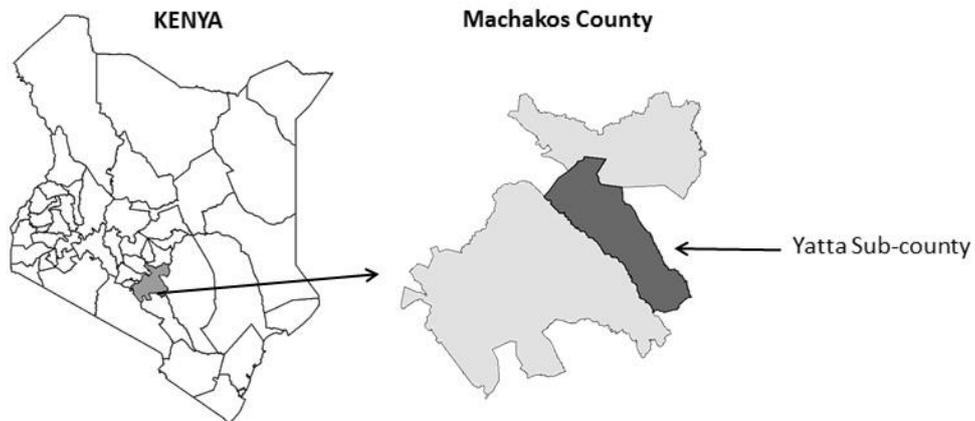
its successor Vision 2030 (2008) [51], which called for an increased contribution of more than 800 million USD annually to the national GDP, in combination with a 30% reduction in food insecurity. These targets were to be achieved by fostering agricultural innovation through the modernization and commercialization of small-scale agriculture [52]. Specific importance has been placed on the development of the arid and semi-arid lands (ASALs), which comprise over 80% of Kenya's land mass [52,53]. Similar to other regions across Sub-Saharan Africa, Kenya's ASALs are characterized by existing environmental degradation, increasing frequency and severity of droughts and floods, and small-scale, subsistence farming with low application of technology [54], as well as limited access to services, markets, electricity, infrastructure, and water [52]. Despite these significant challenges, small-scale agriculture accounts for approximately 75% of total agricultural outputs in Kenya and more than 70% of informal employment in the rural areas, playing a vital role in rural livelihoods [55]. The government of Kenya therefore sees potential in focusing on smallholder farmers as a key group in the commercialization and modernization of farming in the ASALs [52].

A farmer focused and participatory approach to integrated natural resource management has been promoted as being central to fostering agricultural innovation and sustainable rural development within the context of Kenya's ASALs [53]. In striving to meet economic and humanitarian targets, policy and programs have emphasized the need for stakeholder participation and linkages across the agricultural sector, as well as significant institutional reforms considered necessary to allow for the full participation of smallholder farmers [56]. Prominent examples include Kenya's participation in regional initiatives such as the Comprehensive Africa Agriculture Development Program (CAADP); national policies including the Strategy for Revitalizing Agriculture (SRA) (2004) and the Agricultural Sector Development Strategy (ASDS) [52]; and the promulgation of a new constitution in 2010, which greatly decentralized national government power [57].

#### *Study Area—Yatta Sub-County*

Food insecurity in Yatta Sub-county (located in Machakos County, Eastern Kenya, see Figure 1) is pervasive due partly to an overreliance on maize as the staple crop, high average temperatures (ranging from 29 to 36 °C), poor rainfall (ranging between 450 and 800 mm per year), low levels of technology adoption (including inputs such as fertilizer and certified seeds), and poor post-harvest management practices [48,58,59]. At the time of our study, the population of Yatta was ~300,000, with ~75% of households depending primarily on agriculture for their livelihood [58]. Farmers generally employed intercropping methods, with many keeping poultry and larger livestock for meat, eggs, and milk [58]. Rates of household food insecurity were high [59], particularly among women and children [60], with high rates of rural poverty and gender inequality adding further complexity to household food security and agricultural development initiatives [61]. Yatta is primarily inhabited by the Kamba people, who have traditionally been involved in trade but have more recently become widely engaged in small-scale and subsistence agriculture [62,63]. Most farming households are male headed, have attained low levels of formal education, and operate on farm sizes smaller than 10 acres, with increasing demand for land by migrant farmers resulting in declining farm sizes [58]. Like other regions within the ASALs, Yatta has two short growing periods coinciding with the long (March–April–May) and short (October–November–December) rainy seasons, with existing farming systems considered highly vulnerable to the effects of climate change [58,59]. This is mainly because rain-fed agriculture is the norm, rainfall variability is increasing [59], and there has been limited development of irrigation infrastructure in the area. The soils range from clay-based to sandy and, being located on the Yatta plateau, are often extremely rocky and on inclines which require terracing (see Figure 2). The dominant vegetation is dry bush, with soils generally having low fertility and high erosivity [58]. While there is a heavy reliance on maize, other staple crops grown in the area include: cereals (sorghum and millet), pulses (beans, pigeon peas, cow pea, and green grams), and roots and tubers (sweet potato, cassava, yam, and arrowroot). Previous development efforts have identified numerous agricultural practices and technologies that have the potential to enhance farm

resource productivity and livelihood sustainability, however low levels of adoption remain a major policy challenge, partly due to a history of centralized agricultural extension services and systemic failures to adequately account for gender considerations [64].



**Figure 1.** Map of study area, Yatta Sub-county, Machakos County, Kenya.

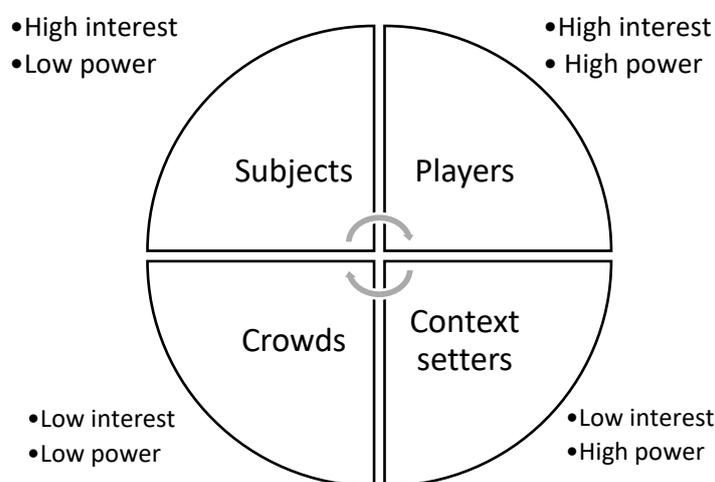


**Figure 2.** Terracing of a farm plot growing maize in Yatta Sub-county, Machakos County, Kenya.

### 3. Methods

#### 3.1. Stakeholder Analysis

Stakeholder analysis is useful when the system under study requires collective action to facilitate innovation [65–67]. Stakeholders can be defined as those with the ability to affect change and decision-making within a particular system [68]. By identifying key stakeholders, their interests, behaviours, interactions, and relative power to affect change, stakeholder analysis can help to assess some of the drivers of, and barriers to, innovation; the potential impacts of certain policy actions, as well as the broader institutional context within which innovation occurs [69]. Stakeholder analysis also allows marginalized or disempowered groups to be identified [60,67,70,71], providing insights into how participatory approaches to learning, innovation, and food security might best promote mutual trust, collective action, and learning [72,73]. Following the guidelines laid out by Schmeer [74] and adapted by Rastogi et al. [75], we sought to determine each stakeholder groups' previous engagement with agricultural innovation projects, as follows: (1) role and interactions—role filled by each stakeholder group within the agricultural sector and their interactions with other stakeholders; (2) knowledge—of relevant agricultural technology, practices, and policy; (3) other resources—that may be mobilized in support or opposition of change; (4) leadership—ability to mobilize collective action; (5) position—on agricultural innovation through commercialization and modernization, as envisioned in the ASDS [64], and potential for conflicts between stakeholder groups; and (6) power—to affect change based on the five preceding factors. In order to analyze stakeholder collaboration dynamics, we initially used a two-way interest-power grid to determine the stakeholder [76]—where “players” are those who have both power and interest, “context setters” are those who are powerful but disinterested stakeholders, “subjects” are those who lack power but are genuinely interested in change (e.g., food-insecure farmers), and “crowds” are those who are low on both dimensions (Figure 3).



**Figure 3.** A two-way interest-power grid for analysis of stakeholder collaboration. *Source:* Adapted from Ackermann and Ede (2011) [76].

We then considered four innovation scenarios [77], irresponsible inaction, irresponsible action, responsible inaction, and responsible action, for each broad stakeholder involved in agricultural innovation initiatives. For the purposes of our analysis, we understood that irresponsible inaction of context setters can put society at risk, and therefore responsible inaction would be preferred. Hence, a responsible innovation platform would be responsible, or not innovating at all, to avoid an irresponsible innovation trajectory, such as an attempt to misuse power to benefit those holding power and privilege [78].

### 3.2. Data Collection and Analysis

Data were collected using semi-structured interviews with key informants in order to develop an understanding of the attitudes, beliefs, values, and motivations of stakeholders [79–81] within the agricultural sector. Interview questions were designed following the guidelines laid out by Grimble and Chan [67], but remained flexible and were dependent on the role and knowledge of the participant. A pre-test of the interview was conducted with three respondents to ensure clarity and minimize interviewer bias. Key informants were then identified in close consultation with colleagues from the Kenya Agricultural and Livestock Research Organisation (KALRO), Kenya Ministry of Agriculture, Livestock, and Fisheries (MoA), Provincial Administration, and a local non-governmental organization (NGO), who assisted with defining and categorizing stakeholders. Snowball sampling techniques were then used to identify additional stakeholders to ensure wide coverage representing all possible stakeholder groups [72]. Within each group we sought to interview a range of individuals with varying levels of influence and power in order to minimize selection bias and improve internal validity [82]. Efforts were also made to ensure the representation of women and youth within the sample, where possible. Throughout the interview process, on-going dialogue was maintained among the research team in order to identify and address potential researcher bias to the best of our abilities, as recommended by Hill et al. [83]. In total, 46 key informant interviews were completed from July to September 2012. Table 1 presents a breakdown of interview participants by stakeholder categorization and gender.

**Table 1.** Breakdown of interview participants ( $N = 46$ ) by stakeholder group and gender.

Stakeholder Group	Participants *
<i>Farmers</i>	
▪ Farmer Group members	9 (4 Women)
<i>Government of Kenya</i>	
▪ Elected Officials	2 (1 Woman)
▪ Ministry of Agriculture, Livestock, and Fisheries (MoA)	3 (1 Woman)
- Agricultural Extension	7
▪ Other Ministries and Departments	5 (1 Woman)
- Provincial Administration **	9
<i>Research Organizations</i>	3
<i>Local Nongovernment Organizations (NGOs)</i>	6 (1 Woman)
<i>International Donors</i>	2

\* Many participants could be grouped into multiple categories (for example those working at research institutions may also identify as farmers); therefore, participants were categorized based on the role they understood themselves to be representing within the context of the interview. \*\* Provincial Administration is the term used throughout this paper as it is still in use by stakeholders; however, in accordance with the implementation of the new constitution, Provincial Administration officers now fall under the categorization of Government administration officers.

Interviews were fully transcribed and translated into English in order to enable manifest content analysis and recursive data coding following the constant comparative method [84]. We adopted a hybrid process of inductive and deductive thematic analysis that integrated data-driven codes with theory-driven codes based on participation and innovation literature [85]. Internal member cross-checking of responses, informal field observation, and review of available external documentation, such as project reports, policies, and agency websites, were used to triangulate findings wherever possible in order to improve trustworthiness and reliability in our analysis [86–88]. All field research protocols were reviewed and approved by the McGill University Research Ethics Board (REB File #: 969-0511) prior to data collection.

### 3.3. Assumptions and Limitations

A limitation of this study is the age of the dataset, with data collected in 2012, and further follow-up, member checking, and local dissemination activities occurring in 2014. We recognize that the local agricultural development context in Yatta Sub-county may have changed since our data collection, indeed we expect that it has, however the policy challenges of chronic household food insecurity and low levels of agricultural sector innovation remain in the semi-arid regions of Kenya, and also exist in many other communities internationally. The case study research method did not allow for generalization to populations, and instead relied on demonstrating reliability and achieving high levels of internal, content, and construct validity through the research design in order to generate substantive theory, which can help to deepen understandings in different contexts [89]. We acknowledged this limitation throughout our data analysis and discussion and were careful not to generalize beyond the case study (i.e., perceptions of agricultural development stakeholders in the Yatta Sub-county in 2012). We interpreted the findings in light of recent literature on agricultural innovation platforms (e.g., [1,9,10]), a field that continues to evolve and increasingly seeks to understand how power and interest influence decision-making. We conducted an ex-ante assessment of agricultural research and innovation initiatives in Yatta Sub-county rather than an ex-post assessment of an existing innovation platform. We adopted this methodological approach to avoid certain biases concerning the perceived merits of platforms that can arise from those who are already involved in specific innovation processes.

Beyond the commonly recognized limitations associated with qualitative case study research [89], stakeholder analysis has its own drawbacks. One of the main limitations is that it tends to make assumptions about which groups constitute legitimate stakeholders without explicitly justifying these assumptions [90]. A counter to this position is that the legitimacy of a group's claim as a stakeholder is less important than their ability to affect change within a given system [91], and this was the general approach taken in this study. Nevertheless, we recognized the assertion that legitimacy is an important factor in determining influence [92] and kept this in mind in the interpretation of our findings. Reed et al. [72] addressed these and other limitations associated with identifying and categorizing stakeholders in a top-down manner, highlighting alternative bottom-up approaches that allow stakeholders to define legitimate and non-legitimate stakeholder groups. By defining our stakeholder groups in collaboration with local partners and then revising these categories throughout our data collection, we were able to employ a level of bottom-up approach to defining the stakeholders. Another important limitation of stakeholder analysis is that, due to the limited timeframe of most projects, it provides only a snapshot of the opinions, roles, resources, relationships, and influence in the system, all of which are dynamic and subject to unexpected transformations [88]. This has implications for the usefulness and generalizability of the results. We therefore focused our discussion on the inter-relationships between stakeholders, how these interactions may have influenced the design, implementation, and outcomes of agricultural innovation initiatives, including associated innovation platforms, rather than treating existing conditions as static realities. Another limitation relates to our locally driven snowball sampling strategy, which made it difficult for us to identify and recruit farmers who were not already members of groups in the community. Farmers who were identified as being appropriate key informants for our study were all members of some type of group; however, these key informants mentioned that there were farmers who may not be participating in groups, although they were not able to recommend anyone appropriate for us to interview. As a result, our results concerning farmers who do not participate in groups reflect only the perspectives of other stakeholder key informants.

## 4. Results and Discussion

Given our focus on better understanding smallholder participation in agricultural innovation platforms, we present our results around the farmers, elaborating on the interactions and attributes of other stakeholders as they pertain to smallholder participation and empowerment. We also combine our results with a discussion of their implications for enhancing participatory agricultural innovation

initiatives in smallholder and subsistence farming systems. Table 2 provides a summary of the reported roles and interactions for all stakeholder groups.

**Table 2.** Key stakeholders in agricultural innovation within Yatta, including their roles and interactions with each other.

Stakeholder Group	Key Roles and Interactions
<i>Farmers</i>	Receive knowledge indirectly through other farmers or alternative sources, such as media.
<ul style="list-style-type: none"> <li>▪ Farmer Groups</li> </ul>	Receive knowledge through agricultural extension, research organizations, and local NGO projects; Determine specific project objectives within predetermined wider project objectives.
<i>Government of Kenya</i>	Set policy, legal framework, and broad funding priorities.
<ul style="list-style-type: none"> <li>▪ Elected Officials</li> </ul>	Determine projects funded through the Constituency Development Fund; Distribute farming inputs received from the MoA.
<ul style="list-style-type: none"> <li>▪ Ministry of Agriculture, Livestock, and Fisheries (MoA)</li> </ul>	Determine agricultural policies, funding priorities, and projects; Inform agricultural extension on policy, projects, and objectives; Train agricultural extension on the latest knowledge/technology in farming; Provide inputs to elected officials for distribution; Work in collaboration with local NGOs.
<ul style="list-style-type: none"> <li>- Agricultural Extension</li> </ul>	Hold and distribute technical knowledge about farming; Provide link between farmers' groups, MoA policies, and knowledge and technology from research institutions; Implement MoA projects; Work in collaboration with local NGOs.
<ul style="list-style-type: none"> <li>▪ Other Ministries/Departments</li> </ul>	Determine a range of policies and regulations; Issue permits; Conduct surveys and inspections.
<ul style="list-style-type: none"> <li>- Provincial Administration</li> </ul>	Mobilize community; Provide security to projects, group meetings, training exercises, etc.; Call community meetings; Inform community about policies and regulations; Distribute aid and farm inputs.
<i>Research Organizations</i>	Identify research needs; Generate new knowledge; Provide expertise and knowledge to agricultural extension and local NGOs; Implement on the ground projects; Supply seeds (at a cost).
<i>Local Nongovernment Organizations (NGO)</i>	Mobilize farmer groups; Work in collaboration with agricultural extension; Source funding from international donors; Provide inputs.
<i>International Donors</i>	Fund the Government of Kenya, research organizations, and local NGOs.
<i>Private Sector</i>	Provide marketing materials to distribute/display; Sell seeds developed by research institutions.

#### 4.1. A Difficult Journey from Technology Transfer to Co-Creation

The participation of smallholder farmers in innovation initiatives was described by participants as being lower than would be desired, based on our understanding that successful participation facilitates social change and empowers the community. Farmers who were not affiliated with a farmer group were described by other stakeholders as being particularly marginalized (high interest, low power). Stakeholders involved in the implementation of agricultural innovation projects—i.e., the Government of Kenya through the MoA and agricultural extension officers, local NGOs, and

research institutions—placed a strong emphasis on increasing the effectiveness and efficiency of farmer participation by working with existing groups. This allows project-implementing stakeholders to capitalize on the existing trust and respect among group members [52]. For example, Bruges and Smith [44] suggested that existing groups may be better able to articulate their concerns and objectives because of the already established levels of trust, making them more ideal candidates for learning, innovation, and policy change. Participants described this approach as being reinforced by a need to deliver measurable outcomes to project funding organizations within limited timeframes. Based on our interviews, farmers who had not previously joined local groups likely had limited interactions with knowledge-rich dominant stakeholders, such as agricultural extension officers and researchers (high interest, high power). Instead, our respondents suggested these farmers may access knowledge concerning agricultural technologies, practices, and policy informally through secondary sources, including the media and other farmers within the community, potentially an ‘under the radar’ minority coalition. Further research specifically focusing on farmers who are not participating in community groups would be valuable. Participation in groups was considered effective for co-creation, as members were able to gain more direct access to new knowledge through their involvement in projects spanning a wide range of activities, from soil management to post-harvest marketing strategies. However, knowledge was reported as generally flowing from the dominant stakeholders at the ‘top’, who set policy and develop new technologies, and who were not necessarily interested in developing inclusive spaces for co-creation.

Transfer of knowledge and technology between project-implementing stakeholder groups was described as generally well facilitated, as they often worked together in their efforts, including the participation of agricultural research institutions in project implementation. This change in the level of stakeholder coordination was summarized by a government researcher as follows:

We have done a lot of reforms in Kenya in agriculture. Before, we were not allowed to go to the farms. We were doing what we call basic science here at the Centre. We developed technologies . . . and then we looked for ways of giving those technologies to extension officers, either through documentation or through meetings. And then there were reforms that we must do ‘on farm’. So ‘on farm’ is multidisciplinary. The farmers’ face is there in the farm, the MoA is there in the farm, the local administration is there in the farm, the local NGOs are there in the farm, and the government scientists are there in the farm, the same day, the same farm, all of us looking at that problem, all of us looking at that solution. That is how we reformed research and development.

The MoA also organized training sessions for extension officers to stay up to date on current research, development priorities, and policies as well as stakeholder meetings, held on a quarterly basis throughout the year. An agricultural extension officer described his view of stakeholder coordination through these meetings by stating: “We facilitate mainly the operationalization of the stakeholder concept, whereby all stakeholders in extension and training in Yatta, we bring them together and discuss and share on what we actually do in the field. So far the stakeholder concept is being operationalized here very well . . . ” However, other stakeholders were less directly involved—either those farmers who did not belong to a group or the private sector. Larger private sector firms, for example, were largely removed from agricultural development conversations and policy initiatives in Yatta Sub-county. While they may have attended stakeholder meetings or held occasional training demonstrations, their products and services were mainly communicated passively through posters and brochures distributed to agricultural extension officers. International donors were described as generally taking a ‘hands-off’ role, increasingly leaving project implementation to local extension officers and NGOs, while sometimes providing them with training on new technologies developed abroad. Other government ministries were described as being primarily involved in agricultural innovation projects through their role as regulatory agencies, conducting evaluation surveys and inspections and issuing permits, for example, for irrigation and water harvesting efforts. As a result,

agricultural extension officers, local NGO workers, and agricultural researchers were described as collectively having a large store of relevant knowledge surrounding agricultural policies, technologies, and farming activities, that makes its way to farmers working in groups directly, with the goal of it then spreading to farmers outside groups indirectly (see [64] for an example).

Farmers were described as having an abundance of local and indigenous knowledge that could make for more effective and relevant agricultural innovation and sustainable development. However, the existing approach to participation was described as not being effective at communicating knowledge “from the bottom to the top” of the agricultural system hierarchy. In many cases, the experiential knowledge of smallholder farmers seemingly conflicted with what expert knowledge suggested. Despite the existence of District Agricultural Development Committees (DADC or DAC), created, in part, to give farmers a platform for communicating their knowledge and concerns to the government, a farmer representative reported never having actually met as a committee:

When there is a report from the District, we wait for them to call us. And one of the functions that we are supposed to be doing is, during the meeting of the DAC, we may give the committee the feelings of the farmers, the problems they might be facing, the help they need, and then the DAC could discuss ways of helping the farmers. But then we only wait to be called. Unless we are called, we do not have the power ourselves to call . . . I would say, the functions of these DACs, if they were active they could have helped the farmer but they are not active.

Furthermore, the day-to-day interactions of agricultural extension officers, NGO workers, and researchers with farmers was described as often maintaining fairly rigid hierarchical structures. This can make it difficult for food-insecure farmers (high interest, low power) to comfortably voice their opinions or share their knowledge. Likewise, entrenched hierarchical structures were described as making it difficult for field-based project implementers to voice concerns to their superiors at the MoA or research institutions. Reciprocal feedback mechanisms for communicating knowledge across the smallholder agricultural innovation system were identified as generally lacking, despite the increase in farmer participation. This finding supports the need to organize around common goals from the beginning to enable interactions and networks that can build social capital and trust [93], which are important factors in effectively communicating knowledge [94], social learning, and innovation [19,95,96].

#### *4.2. Leadership to Create Attractive Visions for Innovation Platforms*

Chiefs and assistant chiefs were described as playing an important leadership role within their communities, as they have the mandate to mobilize people with low power and low interest. This was most often done in the form of calling local meetings to make announcements, for example, the enactment of a new policy, or to give a platform to other stakeholders to communicate information. However, there was a wide range in the degree of community engagement by chiefs and assistant chiefs. While some were described as deeply engaged and regularly called meetings, others were not. In other words, some of them were ‘players’ while others were ‘context setters’. One farmer expressed his frustration: “. . . those people who have powers, like the (provincial) administrators, chiefs and assistant chiefs, if you tell them, can you call a meeting and you come there to sensitize people, they won’t take note” [the context setters with high power, but low interest]. This was described as affecting which provincial administration the agricultural extension officers chose to work with, and therefore a community’s potential involvement in innovation projects, as well access to all of the human, social, financial, and natural capital that go along with this involvement.

Farmers were also identified as having many opportunities to take on leadership roles and promote collective action. They could, for example, do this through forming and managing groups for the purposes of participating in development projects, creating co-operatives, and preparing proposals for funding. However, farmers’ knowledge of the many routes and opportunities that are available for them to engage in collective action was identified as likely to affect how local leaders emerge and the

extent to which farmers lead innovation initiatives. As it is largely the role of provincial administration to communicate project opportunities to farming communities, the level of engagement by chiefs and assistant chiefs beyond the role of context setters (having low interest, high power) was seen as playing a significant role in agricultural innovation. A farmer articulated this as follows:

The community may not be the main problem, but the community may need first to get the knowledge, to be educated so that they have the interest [high interest, low power]. We do not have the powers to call meetings . . . I have been telling them that I don't see why they should rely on the assistant chiefs and the chiefs for meetings because they have a role to play in agriculture. If they only told us, we want to come and talk to the community down there, we ourselves could organize and they could come and talk. But they say no we cannot come unless the chief, the assistant chiefs call the meeting. I have been telling them they have to break away from this protocol . . .

Despite these challenges, the individual leadership of local NGOs, agricultural extension officers, and researchers was also discussed as playing an important role in how agricultural innovation projects are carried out and therefore their impacts on the community. When stakeholders were more engaged, appropriately trained, and supported in their efforts then mutual trust and respect were described as growing, facilitating collaboration and communication in support of innovation (see also [97]). These relationships were also identified as improving the success of future projects. In cases where a community's trust had been diminished through improper management of expectations and poor communication, new innovation initiatives were described as being more likely to face community dissent. For example, in Yatta Sub-county, previous attempts at introducing new varieties of sorghum created unexpected and negative outcomes for participating communities, including what many farmers considered wasted labor resources. This can result in an undesirable situation where vulnerable participants would fail to influence decisions that affect their lives and livelihoods (high interest, low power). This was described as resulting in a lack of trust, with the affected communities resisting (at the time of our interviews) efforts to introduce new crop varieties which have the potential to enhance their food production. Such a situation highlights the important leadership role that NGOs, agricultural extension officers, and researchers working directly to empower communities can play in agricultural innovation, by managing community expectations and ensuring appropriate engagement and support.

#### *4.3. Stakeholder Positions on Learning and Innovation*

Our research participants described a wide range of potential advantages accruing to each stakeholder through improved agricultural system innovation, particularly as conceptualized in the ASDS (2010) [52]—as the commercialization and modernization of small-scale agriculture for increased income generation. However, there were also clear disadvantages identified (see Table 3 for a summary of the advantages and disadvantages for each stakeholder group). For some groups, such as elected officials and members of the provincial administration, participants felt that there were personal advantages associated with not supporting agricultural system innovation due to conflicts of interest among context setters (high power, low interest). Larger private sector operators did not have influence in Yatta Sub-county, which may be partially explained by financial disincentives due to the high levels of poverty and low purchasing capacity among smallholder farmers and the low levels of infrastructure which make profits very difficult to realize. Interestingly, for most non-farmer stakeholder groups, the ASDS (2010) [52] vision of agricultural innovation was seen as being well aligned with their own mandate, with most concerns relating to the potential for conflicts between their own organizational objectives and those of the communities.

**Table 3.** Advantages and disadvantages associated with agricultural innovation as defined by the Agricultural Sector Development Strategy (ASDS) for each stakeholder group.

Stakeholder Group	Position on Learning and Innovation	
	Advantages	Disadvantages
<i>Farmers</i>	Potential increases in yields, income generation, and food security.	Risks associated with investing time, labor, income, and other resources.
<ul style="list-style-type: none"> <li>▪ Farmer Groups</li> </ul>	Potential for collective action to negotiate for community objectives.	Risk of corruption within group management; Risk of project failure once external support is removed.
<i>Government of Kenya</i>		
<ul style="list-style-type: none"> <li>▪ Elected Officials</li> </ul>	Mandate to assist in development efforts for the betterment of the community.	Resources can be used to achieve personal political goals.
<ul style="list-style-type: none"> <li>▪ Ministry of Agriculture, Livestock, and Fisheries (MoA)</li> </ul>	Mandate to end hunger and increase economic growth through increased agricultural production in small-scale farming.	Potential conflict between policies that are beneficial at the national level or for big industry (coffee, tea, sugar) but detrimental at the local level or to small-scale agroecological farming.
<ul style="list-style-type: none"> <li>- Agricultural Extension</li> </ul>	Mandate to assist farmers in becoming self-sufficient and increase agricultural production in small-scale farming.	Potential conflict between balancing project and community objectives.
<ul style="list-style-type: none"> <li>▪ Other Ministries/Departments</li> </ul>		
<ul style="list-style-type: none"> <li>- Provincial Administration</li> </ul>	Mandate to assist in development efforts for the betterment of the community.	Resources can be used to achieve personal goals.
<i>Research Organizations</i>	Mandate to get new knowledge and technology to end-users.	Potential conflict between pushing new knowledge and technology and allowing farmers to determine project objectives through co-creation.
<i>Local Nongovernment Organizations (NGOs)</i>	Mandate to assist in development efforts for the betterment of the community.	Potential conflicts between meeting objectives defined by funding agencies and community objectives.
<i>International Donors</i>	Various mandates to assist in development efforts for the betterment of communities.	Potential conflicts between meeting externally defined objectives and community objectives.
<i>Private Sector</i>	Getting products to end-users; Increasing market demand for products.	Not financially beneficial to focus on small-scale farmers who do not have the resources or access to credit to purchase products.

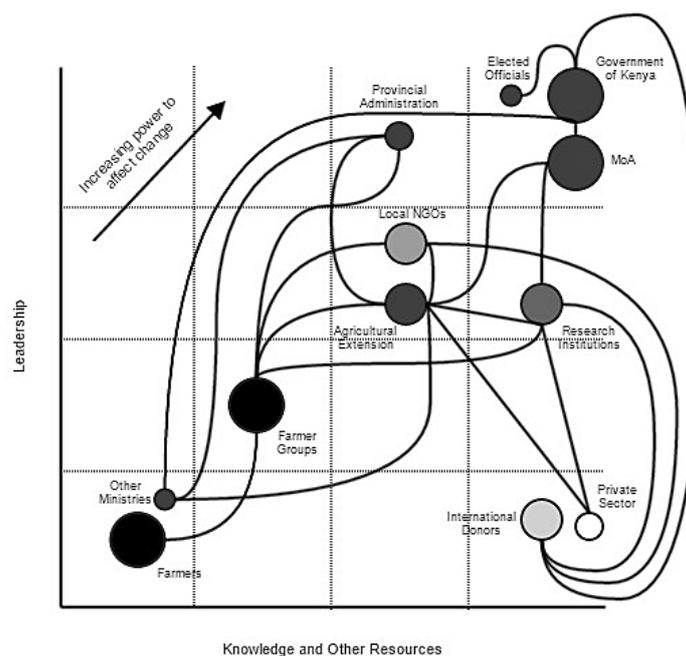
The largest disadvantages associated with supporting the ASDS (2010) [52] vision for agricultural innovation were attributed to smallholder farmers, both those in groups and those outside groups. These stakeholders are the ones whose livelihoods are at stake and whose limited capital assets need to be invested. They therefore risk the most in efforts to modernize their farming systems. They are, however, also the group with the most to gain from agricultural system innovation or structural change through increased opportunity, efficiency, yields, income, household food security, and resilience to the negative effects of environmental change. Nevertheless, the commercialized version of agriculture being pushed by some stakeholder groups primarily interested in farmer profit maximization conflicted with how many farmers viewed farming. For example, selling agricultural products was described by many smallholder farmers as a coping strategy in times of food insecurity rather than a viable business option.

Farmers were therefore reported as being sometimes disinterested in forming groups and participating in innovation projects when they did not see the potential for immediate returns on their time investment (low interest, low power). A farmer captured this sentiment when describing

what went wrong with one particular innovation initiative in his community: “They were saying they can’t be coming, wasting time. They were not refunded. They were not given food. So they were not seeing what they would benefit . . . So they stopped coming.” This points to a need for greater time, open discussion, and careful attention being paid to the various stakeholder objectives for agricultural innovation.

#### 4.4. Empowerment of Minority Coalitions for Learning and Innovation

Overall, despite the increase in participatory innovation projects being undertaken by many stakeholder groups in Yatta Sub-county, smallholder farmers were identified as remaining under-empowered in the agricultural innovation system (see Figure 4). Our research participants identified that there were few functional channels available to farmers for openly communicating their knowledge, needs, and objectives to those responsible for facilitating collective agricultural innovation. As a result, the need for values and beliefs to be well-aligned in order to facilitate project success was predominantly being achieved through farmers aligning their objectives with the innovation project objectives, and rarely the other way around. The power to drive innovation in this context was identified as resting in the hands of those powerful stakeholders who define the policy objectives, distribute resources, and have the ability to mobilize collective action through leadership. What makes a difference is whether these stakeholders choose to be context setters, as most elected officials were reported to be (high power, low interest), or turn into genuinely interested players (high power, high interest), such as government researchers in our study.



**Figure 4.** Stakeholder groups’ relative power to drive innovation within the agricultural system based on levels of access to knowledge and other platform resources, and leadership; circle size represents interest in agricultural innovation (the larger the circle, the higher the interest), circle shading represents stakeholder groupings, and connecting lines represent reported interactions between stakeholder groups.

In Yatta Sub-county the groups with high power were identified as the elected officials, the provincial administrators, and the Government of Kenya, including the MoA and Agricultural Extension and Advisory Services. These more powerful stakeholders, shown in Figure 4, were in most cases described as disinterested context setters within agricultural innovation initiatives. For farmers, what mattered the most was whether an incumbent regime could facilitate collective

action for agricultural innovation and sustainable development in Yatta Sub-county. Our results suggest that the incumbent actors were either players in their own right (high interest, high power) or context setters (high power, low interest) when it comes to an agricultural innovation initiative. Both types of stakeholders could be responsible for sub-optimal results or inaction (either responsible or irresponsible), unless they were genuinely interested in empowering the vulnerable actors who were often viewed as subjects (high interest, low power) or mobilizing disinterested crowds (low power, low interest). A farmer described the situation facing local community members as follows:

They do not have that capacity to confront the MP. They just tend to keep quiet . . . according to the former way of ruling those chiefs and administrators they were the ones . . . who were telling people not to speak anything about these people. So due to that you find that the community still has that mentality even though the constitution has changed. They don't have that freedom to air their grievances, or problems . . . this will take place only if they are sensitized to their rights.

Importantly, smallholder farmers in Yatta Sub-county reported increasing ability to define their own innovation objectives, visions, and interests. However, they would not be able to challenge those in power unless they mobilize minority stakeholders as a group against inaction or raise resources in favor of a preferred policy change. For example, within one agricultural innovation project a farmers' group was empowered to select which crop they would like to focus their efforts on, ultimately choosing green grams over a list of other options. This represented an increase in their level of power in learning and innovation, although they were unable to affect the broader project objective of commercializing small-scale agriculture by promoting the selling and marketing of a list of pre-determined crops. In this way, participation often requires locals to 'fit in' to external ideas and beliefs of what an appropriate platform looks like [98] in order to access information or technology. Nevertheless, an NGO worker expressed his view as follows, "If we compare the current policies, which the government has put in place, they are better by far", a sentiment shared among most stakeholders interviewed in our study.

Our case study points to the potential for stakeholder participation in agriculture development initiatives to reinforce policy goals that are misaligned with the objectives of smallholder farmers [44]. In Yatta Sub-county, agricultural innovation was being defined in terms of commercializing and modernizing small-scale agriculture in line with the ASDS (2010) [52], and subsequently driving the types of initiatives being proposed and implemented by agricultural extension officers and researchers. What was missing in this supply-side focus is that the farmers do not necessarily produce for the market, although the introduction of commercial crops can generate extra income for them to meet other essential services, such as school fees and medical expenses [63]. While we found provisions for farmers to have a voice in policy and programs, through the establishment of local committees that can define priorities and areas of financial focus, our results suggest that in practice these committees, as minority coalitions—within or outside the purview of dominant coalitions—may remain inactive (irresponsibly or otherwise) unless they are empowered to advocate for their shared identity, interests, and beliefs. Such coalitions can be formed within an innovation platform to empower vulnerable stakeholders from within or forming a parallel, often competing, innovation platform to negotiate with the dominant actors from outside. Positive outcomes may result from adopting inclusive definitions of legitimate stakeholders and ensuring an explicit focus on the empowerment of marginalized groups from the very beginning of agricultural innovation initiatives (see [99]).

#### *4.5. Mobilization of Platform Resources*

Respondents described that the decisions of powerful stakeholders determine farmers' access to resources beyond knowledge, including farm inputs, such as fertilizer or new seed varieties, new devices for post-harvest processing and storage, and livestock vaccinations. As long as these powerful actors remain context setters, without a genuine interest in making a difference 'on the ground', those representing the dominant coalitions may choose inaction, which could be responsible or irresponsible

inaction. Similar to knowledge (human capital), other resources (social, political, financial, physical, and sometimes natural capital) are channeled through agricultural innovation projects to farmers working within groups [97]. However, beyond direct project involvement, politically powerful stakeholders, such as elected officials and members of the provincial administration, local chiefs and assistant chiefs, were also identified as playing a large role in deciding where resources get channeled. Elected officials were identified as having considerable influence when determining which local initiatives were funded, and where, through their control of the Constituency Development Fund (CDF). These public funds were available to local initiatives, through the submission of a proposal to a committee, for all development activities. However, our participants indicated that elected officials ultimately controlled which projects received funding and expressed concerns over the potential for capture if appropriate checks and balances were not in place. This was a sensitive issue for our participants; however, in response to questions about how political influence exerted by Members of Parliament (MPs) affected project funding, one chief replied, “Yes, that is there; it is there. There is always that political influence.” Another respondent, who was a government researcher, speculated: “MPs don’t see what we see because sometimes they look at it like they want that community to be hungry so that they can be getting relief (aid). So sometimes it depends on which MP.”

Chiefs and assistant chiefs were also involved in the distribution of relief seeds along with the provision of security services, and there was a similar potential for unfair dealings raised by our respondents. Additionally, chiefs and assistant chiefs were often directly involved in determining which farmer groups become involved in agricultural innovation projects, as agricultural extension officers and researchers generally worked with them to identify potential farmers’ groups that could be included in their projects. In our study area, individuals who were already disadvantaged by provincial administrators who did not facilitate their engagement in community collective action may become further marginalized by their likely exclusion from agricultural innovation initiatives. This finding is also supported by Lebel et al. [100] who, after analyzing multiple case studies, concluded that authority figures with legitimate power can be very influential in preventing the marginalization of vulnerable groups.

While innovation platforms can offer a practical way to mobilize collective innovation resources through capacity building, the formation of networks and trust, articulating demands and objectives, negotiating with other stakeholders, sharing knowledge, and advocating for policy change [11], without thoroughly considering existing power dynamics, they risk falling short of their stated participation and responsible innovation objectives [1].

## 5. Conclusions

The challenges facing many of Kenya’s rural communities, including widespread poverty and household food insecurity, make increasing the productivity of the agricultural sector a high government priority. The agricultural policies and programs that have been put in place tend to emphasize the importance of building stakeholder linkages and ensuring the participation of small-scale farmers in driving innovation and economic growth. Within this context, innovation platforms have been identified as a viable way to promote technological innovation and market access in rural Kenya [101]. However, the extent to which they also account for the more intangible and normative institutional aspects of empowering vulnerable smallholder farmers remains unclear. Depending on who leads an innovation initiative, with what interests and beliefs, existing power structures will be reinforced or challenged to varying degrees. While innovation platforms may create inclusive spaces for participation, dominant stakeholders with legitimate power and privilege can reinforce the trajectory of modernization and commercialization for their own interests and benefits [1]. Community-led initiatives can be an answer to irresponsible innovation or inaction, but their success depends on platform members’ capacity to negotiate with more powerful stakeholders to initiate and mainstream responsible innovation initiatives [9]. Our empirical case study suggests that unless vulnerable stakeholders are empowered through the formation of minority coalitions within or outside a formal innovation platform, existing

power dynamics have the potential to result in tokenistic participation of vulnerable stakeholders and the interests of stakeholders holding positions of legitimate power and privilege being advanced. Research results revealed substantial asymmetries between smallholder farmers and other stakeholder groups, including access to and control over human and other (social, financial, physical, and natural) forms of capital, the leadership to mobilize collective action, the prioritizing of objectives, and the resulting power, interests, and beliefs to drive and direct change and innovation within and beyond their communities. The potential for further marginalizing disempowered groups and reinforcing existing power hierarchies should be of interest to those looking to implement responsible innovation interventions, particularly given the historically entrenched, highly bureaucratic institutions that regulate development activities in rural Kenya. Forming minority coalitions within or outside of an innovation initiative can put vulnerable stakeholders in a better position to advocate for their rights and effectively articulate their concerns. The challenge, however, is not only the empowerment of vulnerable stakeholders, but also creating a sense of urgency among powerful stakeholders who serve as context setters. Based on our findings, these issues may include how to practically deal with power asymmetries between stakeholders, advocate for disempowered groups, and avoid conforming to the objectives of those holding positions of authority, despite their legitimate influence within innovation, change, and decision-making processes.

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## References

1. Cullen, B.; Tucker, J.; Snyder, K.; Lema, Z.; Duncan, A. An analysis of power dynamics within innovation platforms for natural resource management. *Innov. Dev.* **2014**, *4*, 259–275. [[CrossRef](#)]
2. Klerkx, L.; van Mierlo, B.; Leeuwis, C. Evolution of systems approaches to agricultural innovation: Concepts, analysis and interventions. In *Farming Systems Research into the 21st Century: The New Dynamic*; Darnhofer, I., Gibbon, D., Dedieu, B., Eds.; Springer: Dordrecht, The Netherlands, 2012; pp. 457–483.
3. Spielman, D.J. Innovation Systems Perspectives on Developing-Country Agriculture: A Critical Review. In *International Service for National Agricultural Research (ISNAR) Discussion Paper No. 2*; International Food Policy Research Institute (IFPRI): Washington, DC, USA, 2005.
4. Biggs, S.D.; Clay, E.J. Sources of innovation in agricultural technology. *World Dev.* **1981**, *9*, 321–336. [[CrossRef](#)]
5. Biggs, S.D. A multiple source of innovation model of agricultural research and technology promotion. *World Dev.* **1990**, *18*, 1481–1499. [[CrossRef](#)]
6. Hall, A.; Bockett, G.; Taylor, S.; Sivamohan, M.V.K.; Clark, N. Why Research Partnerships Really Matter: Innovation Theory, Institutional Arrangements and Implications for Developing New Technology for the Poor. *World Dev.* **2001**, *29*, 783–797. [[CrossRef](#)]

7. Hall, A.; Rasheed Sulaiman, V.; Clark, N.; Yoganand, B. From measuring impact to learning institutional lessons: An innovation systems perspective on improving the management of international agricultural research. *Agric. Syst.* **2003**, *78*, 213–241. [[CrossRef](#)]
8. Pigford, A.; Hickey, G.M.; Klerkx, L. Beyond Agricultural Innovation Systems? Exploring an Agricultural Innovation Ecosystems approach for niche design and development in sustainability transitions. *Agric. Syst.* **2018**, *164*, 116–121. [[CrossRef](#)]
9. Schut, M.; Cadilhon, J.-J.; Misiko, M.; Dror, A.I. Do mature innovation platforms make a difference in agricultural research for development? A meta-analysis of case studies. *Exp. Agric.* **2018**, *54*, 96–119. [[CrossRef](#)]
10. Schut, M.; Kamanda, J.; Gramzow, A.; Dubois, T.; Stoian, D.; Andersson, J.A.; Dror, I.; Sartas, M.; Mur, R.; Kassam, S.; et al. Innovation platforms in agricultural research for development: Ex-ante appraisal of the purposes and conditions under which innovation platforms can contribute to agricultural development outcomes. *Exp. Agric.* **2018**, *55*, 575–596. [[CrossRef](#)]
11. Kilelu, C.W.; Klerkx, L.; Leeuwis, C. Unravelling the role of innovation platforms in supporting co-evolution of innovation: Contributions and tensions in a smallholder dairy development programme. *Agric. Syst.* **2013**, *118*, 65–77. [[CrossRef](#)]
12. Klerkx, L.; Aarts, N.; Leeuwis, C. Adaptive management in agricultural innovation systems: The interactions between innovation networks and their environment. *Agric. Syst.* **2010**, *103*, 390–400. [[CrossRef](#)]
13. Klerkx, L.; Leeuwis, C. Establishment and embedding of innovation brokers at different innovation system levels: Insights from the Dutch agricultural sector. *Technol. Soc.* **2009**, *76*, 849–860. [[CrossRef](#)]
14. Kilelu, C.W.; Klerkx, L.; Leeuwis, C.; Hall, A. Beyond knowledge brokering: An exploratory study on innovation intermediaries in an evolving smallholder agricultural system in Kenya. *Knowl. Manag. Dev. J.* **2011**, *7*, 84–108. [[CrossRef](#)]
15. Hounkonnou, D.; Kossou, D.; Kuyper, T.W.; Leeuwis, C.; Nederlof, E.S.; Röling, N.; Sakyi-Dawson, O.; Traoré, M.; Huis, A. An innovation systems approach to institutional change: Smallholder development in West Africa. *Agric. Syst.* **2012**, *108*, 74–83. [[CrossRef](#)]
16. Nyikahadzoi, K.; Siziba, S.; Mango, N.; Mapfumo, P.; Adekunle, A.; Fatunbi, O. Creating food self reliance among the smallholder farmers of eastern Zimbabwe: Exploring the role of integrated agricultural research for development. *Food Secur.* **2012**, *4*, 647–656. [[CrossRef](#)]
17. Struik, P.C.; Klerkx, L.; van Huis, A.; Röling, N.G. Institutional change towards sustainable agriculture in West Africa. *Int. J. Agric. Sustain.* **2014**, *12*, 203–213. [[CrossRef](#)]
18. Foran, T.; Butler, J.R.A.; Williams, L.J.; Wanjura, W.J.; Hall, A.; Carter, L.; Carberry, P. Taking Complexity in Food Systems Seriously: An Interdisciplinary Analysis. *World Dev.* **2014**, *61*, 85–101. [[CrossRef](#)]
19. Saint Ville, A.S.; Hickey, G.M.; Locher, U.; Phillip, L.E. Exploring the role of social capital in influencing knowledge flows and innovation in smallholder farming communities in the Caribbean. *Food Secur.* **2016**, *8*, 535–549. [[CrossRef](#)]
20. Tompkins, E.L.; Adger, W. Does adaptive management of natural resources enhance resilience to climate change? *Ecol. Soc.* **2004**, *9*, 10. [[CrossRef](#)]
21. Swaans, K.; Boogaard, B.; Bendapudi, R.; Taye, H.; Hendrickx, S.; Klerkx, L. Operationalizing inclusive innovation: Lessons from innovation platforms in livestock value chains in India and Mozambique. *Innov. Dev.* **2014**, *4*, 239–257. [[CrossRef](#)]
22. Amaru, S.; Chhetri, N.B. Climate adaptation: Institutional response to environmental constraints, and the need for increased flexibility, participation, and integration of approaches. *Appl. Geogr.* **2013**, *39*, 128–139. [[CrossRef](#)]
23. Pereira, L.; Ruysenaar, S. Moving from traditional government to new adaptive governance: The changing face of food security responses in South Africa. *Food Secur.* **2012**, *4*, 41–58. [[CrossRef](#)]
24. Bahadur, A.; Tanner, T. Transformational resilience thinking: Putting people, power and politics at the heart of urban climate resilience. *Environ. Urban.* **2014**, *26*, 200–214. [[CrossRef](#)]
25. Cote, M.; Nightingale, A.J. Resilience thinking meets social theory Situating social change in socio-ecological systems (SES) research. *Prog. Hum. Geogr.* **2012**, *36*, 475–489. [[CrossRef](#)]
26. Turner Li, B.L. Vulnerability and resilience: Coalescing or paralleling approaches for sustainability science? *Glob. Environ. Chang.* **2010**, *20*, 570–576. [[CrossRef](#)]

27. Mulema, A.A.; Mazur, R.E. Motivation and participation in multi-stakeholder innovation platforms in the Great Lakes Region of Africa. *Community Dev. J.* **2016**, *51*, 212–228. [[CrossRef](#)]
28. Chambers, R. *Whose Reality Counts? Putting the First Last*; Intermediate Technology Publications Ltd (ITP): London, UK, 1997.
29. Cornwall, A.; Pratt, G. The use and abuse of participatory rural appraisal: Reflections from practice. *Agric. Hum. Values* **2011**, *28*, 263–272. [[CrossRef](#)]
30. Chambers, R. Participatory rural appraisal (PRA): Analysis of experience. *World Dev.* **1994**, *22*, 1253–1268. [[CrossRef](#)]
31. Kenmore, P.E. How rice farmers clean up the environment conserve biodiversity raise more food make higher profits. Indonesia's integrated pest management—A model for Asia. In *FAO Inter-country Program for the Development and Application of Integrated Pest Control in Rice in South and South-east Asia*; FAO: Metro Manila, Philippines, 1991.
32. Cornwall, A. Unpacking 'Participation': Models, meanings and practices. *Community Dev. J.* **2008**, *43*, 269–283. [[CrossRef](#)]
33. Arnstein, S.R. A Ladder of Citizen Participation. *J. Am. Plan. Assoc.* **1969**, *35*, 216–224. [[CrossRef](#)]
34. Ashby, J.A. What do We Mean by Participatory Research in Agriculture? 1997. Available online: [https://cgspace.cgiar.org/bitstream/handle/10568/55892/S540.8.C4\\_N4\\_C3\\_International\\_seminar\\_on\\_participatory\\_research\\_and\\_gender.pdf?sequence=1](https://cgspace.cgiar.org/bitstream/handle/10568/55892/S540.8.C4_N4_C3_International_seminar_on_participatory_research_and_gender.pdf?sequence=1) (accessed on 29 October 2019).
35. Biggs, S.D. *Resource-Poor Farmer Participation in Research: A Synthesis of Experiences from Nine National Agricultural Research Systems (No. 0185–0601)*; International Service for National Agricultural Research: The Hague, The Netherlands, 1989.
36. Lambrou, Y.; Ashby, J.A. A Typology: Participatory Research and Gender Analysis in Natural Resource Management Research. Cali, Colombia 2000. Available online: [https://cgspace.cgiar.org/bitstream/handle/10568/69998/A\\_Typology\\_Participatory\\_Research\\_Gender\\_Analysis\\_Natural\\_Resource\\_Management.pdf?sequence=1](https://cgspace.cgiar.org/bitstream/handle/10568/69998/A_Typology_Participatory_Research_Gender_Analysis_Natural_Resource_Management.pdf?sequence=1) (accessed on 29 October 2019).
37. Pretty, J.N. Participatory learning for sustainable agriculture. *World Dev.* **1995**, *23*, 1247–1263. [[CrossRef](#)]
38. Neef, A.; Neubert, D. Stakeholder participation in agricultural research projects: A conceptual framework for reflection and decision-making. *Agric. Hum. Values* **2011**, *28*, 179–194. [[CrossRef](#)]
39. Cooke, B.; Kothari, U. *Participation: The New Tyranny?* Zed Books: London, UK, 2001.
40. Agarwal, B. Participatory Exclusions, Community Forestry, and Gender: An Analysis for South Asia and a Conceptual Framework. *World Dev.* **2001**, *29*, 1623–1648. [[CrossRef](#)]
41. Kellert, S.R.; Mehta, J.N.; Ebbin, S.A.; Lichtenfeld, L.L. Community natural resource management: Promise, rhetoric, and reality. *Soc. Nat. Resour.* **2000**, *13*, 705–715.
42. Leach, M.; Mearns, R.; Scoones, I. Environmental entitlements: Dynamics and institutions in community-based natural resource management. *World Dev.* **1999**, *27*, 225–247. [[CrossRef](#)]
43. Michener, V.J. The participatory approach: Contradiction and co-option in Burkina Faso. *World Dev.* **1998**, *26*, 2105–2118. [[CrossRef](#)]
44. Bruges, M.; Smith, W. Participatory approaches for sustainable agriculture: A contradiction in terms? *Agric. Hum. Values* **2008**, *25*, 13–23. [[CrossRef](#)]
45. Williams, G. Evaluating participatory development: Tyranny, power and (re) politicisation. *Third World Q.* **2004**, *25*, 557–578. [[CrossRef](#)]
46. Holling, C.S.; Meffe, G.K. Command and control and the pathology of natural resource management. *Conserv. Biol.* **1996**, *10*, 328–337. [[CrossRef](#)]
47. Reed, M.S. Stakeholder participation for environmental management: A literature review. *Biol. Conserv.* **2008**, *141*, 2417–2431. [[CrossRef](#)]
48. KFSSG. *The 2014 Long Rains Season Assessment Report*; Government of Kenya: Nairobi, Kenya, 2014. Available online: <https://reliefweb.int/report/kenya/2014-long-rains-season-assessment-report-august-2014> (accessed on 29 October 2019).
49. Government of Kenya (GoK). *Constitution of Kenya*; Government of Kenya: Nairobi, Kenya, 2010. Available online: <http://kenyalaw.org/kl/index.php?id=398> (accessed on 29 October 2019).
50. GoK. *Economic Recovery Strategy for Wealth and Employment Creation 2003–2007*; Government of Kenya: Nairobi, Kenya, 2003. Available online: <http://siteresources.worldbank.org/KENYAEXTN/Resources/ERS.pdf> (accessed on 29 October 2019).

51. GoK. *Kenya Vision 2030*; Government of Kenya: Nairobi, Kenya, 2008. Available online: <https://vision2030.go.ke/> (accessed on 29 October 2019).
52. GoK. *Agricultural Sector Development Strategy 2010–2020*; Government of Kenya: Nairobi, Kenya, 2010. Available online: <http://extwprlegs1.fao.org/docs/pdf/ken140935.pdf> (accessed on 29 October 2019).
53. Miruka, M.; Okello, J.; Kirigua, V.; Murithi, F. The role of the Kenya Agricultural Research Institute (KARI) in the attainment of household food security in Kenya: A policy and organizational review. *Food Sec.* **2012**, *4*, 341–354. [[CrossRef](#)]
54. Müller, C.; Cramer, W.; Hare, W.L.; Lotze-Campen, H. Climate change risks for African agriculture. *Proc. Natl. Acad. Sci. USA* **2011**, *108*, 4313–4315. [[CrossRef](#)]
55. Hickey, G.M.; Pelletier, B.; Brownhill, L.; Kamau, G.; Maina, I. Preface: Challenges and opportunities for enhancing food security in Kenya. *Food Sec.* **2012**, *4*, 333–340. [[CrossRef](#)]
56. MAFAP. *Review of Food and Agricultural Policies in Kenya*; FAO: Rome, Italy, 2013.
57. Brownhill, L.; Moturi, T.; Hickey, G.M. Accountability and citizen participation in devolved agricultural policy-making: Insights from Makueni County, Kenya. In *Food Security, Gender and Resilience: Improving Smallholder and Subsistence Farming*; Brownhill, L., Njuguna, E., Bothi, K., Pelletier, B., Muhammad, L.W., Hickey, G.M., Eds.; Routledge: London, UK, 2016; pp. 158–174.
58. Mburu, K. Effects of Climate Variability and Change on Dry land Agriculture and the Adaptation strategies by Small Scale Farmers in Yatta District. Ph.D. Thesis, Kenyatta University, Nairobi, Kenya, 2013.
59. Mburu, B.K.; Kung'u, J.B.; Muriuki, J.N. Effects of climate variability and change on household food sufficiency among small-scale farmers of Yatta district, Kenya. *J. Environ.* **2014**, *3*, 19–27.
60. Bukania, Z.N.; Mwangi, M.; Karanja, R.M.; Mutisya, R.; Kombe, Y.; Kaduka, L.U.; Johns, T. Food Insecurity and Not Dietary Diversity Is a Predictor of Nutrition Status in Children within Semiarid Agro-Ecological Zones in Eastern Kenya. *J. Nutr. Metab.* **2014**, *2014*, 9. [[CrossRef](#)] [[PubMed](#)]
61. Po, J.Y.T.; Bukania, Z.; Muhammad, L.; Hickey, G.M. Associations between maternal participation in agricultural decision-making and child nutrition in semi-arid Kenya. *J. Hunger. Environ. Nutr.* **2019**, 1–26. [[CrossRef](#)]
62. Nelson, H.D.; Kaplan, I. *Kenya, a Country Study*; Area Handbook Series; United States Government Printing: Washington, DC, USA, 1983.
63. Po, J.Y.T.; Hickey, G.M. Local institutions and smallholder women's access to land resources in semi-arid Kenya. *Land Use Pol.* **2018**, *76*, 252–263. [[CrossRef](#)]
64. Muhammad, L.W.; Maina, I.N.; Pelletier, B.; Hickey, G.M. A participatory and integrated agricultural extension approach to enhancing farm resilience through innovation and gender equity. In *Food Security, Gender and Resilience: Improving Smallholder and Subsistence Farming*; Brownhill, L., Njuguna, E., Bothi, K., Pelletier, B., Muhammad, L.W., Hickey, G.M., Eds.; Routledge: London, UK, 2016; pp. 35–61.
65. Benedetto, G.; Carboni, D.; Corinto, G.L. The Stakeholder Analysis: A Contribution toward Improving Impact of Rural Policy. In *Agricultural Cooperative Management and Policy*; Zopounidis, C., Kalogeras, N., Mattas, K., van Dijk, G., Baourakis, G., Eds.; Springer International Publishing: Cham, Switzerland, 2014; pp. 179–196.
66. Grimble, R.; Wellard, K. Stakeholder methodologies in natural resource management: A review of principles, contexts, experiences and opportunities. *Agric. Syst.* **1997**, *55*, 173–193. [[CrossRef](#)]
67. Grimble, R.; Chan, M.-K. Stakeholder analysis for natural resource management in developing countries. *Nat. Resour. Forum* **1995**, *19*, 113–124. [[CrossRef](#)]
68. Freeman, R.E. *Strategic Management: A Stakeholder Approach*; Cambridge University Press: Cambridge, UK, 2010.
69. Brugh, R.; Varvasovszky, Z. Stakeholder analysis: A review. *Health Policy Plan.* **2000**, *15*, 239–246. [[CrossRef](#)]
70. Prell, C.; Hubacek, K.; Reed, M. Stakeholder Analysis and Social Network Analysis in Natural Resource Management. *Soc. Nat. Resour.* **2009**, *22*, 501–518. [[CrossRef](#)]
71. Mitchell, R.K.; Agle, B.R.; Wood, D.J. Toward a theory of stakeholder identification and salience: Defining the principle of who and what really counts. *Acad. Manag. Rev.* **1997**, *22*, 853–886. [[CrossRef](#)]

72. Reed, M.S.; Graves, A.; Dandy, N.; Posthumus, H.; Hubacek, K.; Morris, J.; Prell, C.; Quinn, C.H.; Stringer, L.C. Who's in and why? A typology of stakeholder analysis methods for natural resource management. *J. Environ. Manag.* **2009**, *90*, 1933–1949. [CrossRef]
73. Freeman, R.E. *Strategic Management: A Stakeholder Approach*; Pitman Publishing: Boston, MA, USA, 1984.
74. Schmeer, K. *Guidelines for Conducting a Stakeholder Analysis*; PHR, Abt Associates: Bethesda, MA, USA, 1999.
75. Rastogi, A.; Badola, R.; Hussain, S.A.; Hickey, G.M. Assessing the utility of stakeholder analysis to Protected Areas management: The case of Corbett National Park, India. *Biol. Conserv.* **2010**, *143*, 2956–2964. [CrossRef]
76. Ackermann, F.; Eden, C. Strategic Management of Stakeholders: Theory and Practice. *Long Range Plan.* **2011**, *44*, 179–196. [CrossRef]
77. Guston, D.H. Responsible innovation: Who could be against that? *J. Responsible Innov.* **2015**, *2*, 1–4. [CrossRef]
78. de Hoop, E.; Pols, A.; Romijn, H. Limits of responsible innovation. *J. Responsible Innov.* **2016**, *3*, 110–134. [CrossRef]
79. Berg, B.L.; Lune, H. *Qualitative Research Methods for the Social Sciences*; Pearson: Boston, MA, USA, 2006; Volume 5.
80. Patton, M.Q. *Qualitative Research*; Wiley Online Library: Hoboken, NJ, USA, 2005.
81. Wengraf, T. *Qualitative Research Interviewing: Biographic Narrative and Semi-Structured Methods*; Sage Publications: Oaks, CA, USA, 2001.
82. Maxwell, J.A. *Qualitative Research Design: An Interactive Approach*; Sage Publications: Thousand Oaks, CA, USA, 2012; Volume 41.
83. Hill, C.E.; Knox, S.; Thompson, B.J.; Williams, E.N.; Hess, S.A.; Ladany, N. Consensual qualitative research: An update. *J. Couns. Psychol.* **2005**, *52*, 196. [CrossRef]
84. Glaser, B.G.; Strauss, A.L. *Discovery of Grounded Theory: Strategies for Qualitative Research*; Routledge: London, UK, 1967.
85. Fereday, J.; Muir-Cochrane, E. Demonstrating rigor using thematic analysis: A hybrid approach of inductive and deductive coding and theme development. *Int. J. Qual. Methods* **2006**, *5*, 80–92. [CrossRef]
86. Creswell, J.W.; Clark, V.L.P. *Designing and Conducting Mixed Methods Research*; Sage Publications: Thousand Oaks, CA, USA, 2007.
87. Johnson, R.B. Examining the validity structure of qualitative research. *Education* **1997**, *118*, 282.
88. Varvasovszky, Z.; Brugha, R. A stakeholder analysis. *Health Policy Plan.* **2000**, *15*, 338–345. [CrossRef]
89. Yin, R.K. *Case Study Research and Applications: Design and Methods*; Sage Publications: Thousand Oaks, CA, USA, 2017.
90. Friedman, A.L.; Miles, S. Developing stakeholder theory. *J. Manag. Stud.* **2002**, *39*, 1–21. [CrossRef]
91. Frooman, J. Stakeholder influence strategies. *Acad. Manag. Rev.* **1999**, *24*, 191–205. [CrossRef]
92. Friedman, A.L.; Miles, S. *Stakeholders: Theory and Practice*; Oxford University Press: Oxford, UK, 2006.
93. Mayunga, J.S. *Understanding and Applying the Concept of Community Disaster Resilience: A Capital-based Approach*; Working Paper Prepared for the Summer Academy for Social Vulnerability and Resilience Building; Munich, Germany, 2007; Available online: <https://pdfs.semanticscholar.org> (accessed on 19 December 2019).
94. Eidt, C.; Hickey, G.; Curtis, M. Knowledge integration and the adoption of new agricultural technologies: Kenyan perspectives. *Food Sec.* **2012**, *4*, 355–367. [CrossRef]
95. Pant, L.P. Learning and innovation competence in agricultural and rural development. *J. Agric. Educ. Ext.* **2012**, *18*, 205–230. [CrossRef]
96. Saint Ville, A.; Hickey, G.M.; Phillip, L.E. Addressing food and nutrition insecurity in the Caribbean through domestic smallholder farming system innovation. *Reg. Environ. Chang.* **2015**, *15*, 1325–1339. [CrossRef]
97. Reed, G.; Hickey, G.M. Contrasting innovation networks in smallholder agricultural producer cooperatives: Insights from the Niayes Region of Senegal. *J. Co-Oper. Organ. Manag.* **2016**, *4*, 97–107. [CrossRef]
98. Olwig, M.F. Multi-sited resilience: The mutual construction of “local” and “global” understandings and practices of adaptation and innovation. *Appl. Geogr.* **2012**, *33*, 112–118. [CrossRef]
99. Berthet, E.T.; Hickey, G.M.; Klerkx, L. Opening design and innovation processes in agriculture: Insights from design and management sciences and future directions. *Agric. Syst.* **2018**, *165*, 111–115. [CrossRef]

100. Lebel, L.; Anderies, J.M.; Campbell, B.; Folke, C.; Hatfield-Dodds, S.; Hughes, T.P.; Wilson, J. Governance and the capacity to manage resilience in regional social-ecological systems. *Ecol. Soc.* **2006**, *11*, 19. [[CrossRef](#)]
101. Makini, F.W.; Kamau, G.M.; Makelo, M.N.; Adekunle, W.; Mburathi, G.K.; Misiko, M.; Pali, P.; Dixon, J. *Operational Field Guide for Developing and Managing Local Agricultural Innovation Platforms*; KARI: Nairobi, Kenya, 2013; p. 92.



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