

Full Length Research Paper

Effectiveness of bylaws in supporting sustainable crop intensification: A case of potato farming in Southwestern Uganda

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The study assessed the effectiveness of formal and informal bylaws in supporting sustainable crop intensification in potato farming regions of Southwestern Uganda. An exploratory case-study descriptive design was adopted, involving both qualitative and quantitative approaches. The study relied on data from the review of the existing formal and informal bylaws on sustainable crop intensification, key informant interviews, and focus group discussions. A total of 41 bylaws were assessed, involving key informants (22) and FDGs (6) respondents who participated in the study. The effectiveness of formal bylaws was high, because of the significant scores (7-8) on individual principles of effective institutions, with the highest principles being principle 2 (18%) and 7 (18%), and lowest being principle 8 (3%). The informal bylaws covered significantly only 2 principles of effective institutions from the total score 3 (100%). That is, principle 7 (37%) and 2 (33%), respectively. The coverage for 6 out of 8 principles was significantly very low. The study found greater levels of effectiveness significant for 7 out of 8 principles of effective institutions on formal bylaws more than informal bylaws (significant for principle 7 and 2 only), and most effective of the principles being principles 2 and 7 on both categories of bylaws. The study demonstrated the importance of both formal and informal bylaws in supporting SCI as both synergised each other in supporting intensification processes. The study recommends adapting existing bylaws to the eight designated principles of institutional effectiveness.

Key words: Uganda, sustainable crop intensification, formal bylaws, informal bylaws, Ostrom's eight design principles, institutions, policy implementation.

INTRODUCTION

The practice of designing and implementing policies at the local level has often been used to enhance

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sustainable potato crop intensification (SCI) and ensure sustainable development of Southwestern Uganda (SWU) (Makuma-Massa et al., 2020). As a consequence, SCI was fronted as key pathway to food security (Otsuka and Place, 2014). The governments and development partners in Sub-Saharan Africa (SSA) recognized SCI as important strategy for increasing crop productivity and meeting both food and income needs of growing populations, while preventing overexploitation of land and water resources (Godfray and Garnett, 2014). However, there was limited information on the role of bylaws in supporting SCI as a strategy of increasing potato productivity.

The SCI strategy increased and maximized use of agricultural inputs. The farmers benefitted from efficiency associated with using agricultural inputs, ensured high crop production, and preserved integrity of the environment (Vanlauwe et al., 2014; Chartres and Noble, 2015). Most SCI efforts in Uganda involved funding, innovations, technology, and policy development, with the aim of transforming cropping systems in areas characterized by high potential for intensification. As a fully-fledged program, SCI encouraged adoption of good agricultural practices and access to farm inputs (Binswanger-Mkhize and Savastano, 2016). In practice, adoption rates of good agricultural practices and inputs were low, and the challenges to increased production and productivity remained (Kasirye, 2013). The previous practice of increasing agricultural production involved expansion of arable land, which was not sustainable due to increasing population and shrinking sizes of farmland (Muyanga and Jayne, 2014). Therefore, SCI emerged in the region as broad range of practices and contexts that provided sustainable solutions to low agricultural production and increased economic benefits to potato farmers in the region, such as improved livelihoods and economic growth. This was not without adhering to agro-ecological principles, as well as applying new technologies and efficient management styles to potato farming system (Future for Food and Farming, 2011). Therefore, principled potato production practices were not only encouraged, but enforced, to increase production on sustainable basis. This required communal institutional support systems to successfully evolve. The bylaws (both formal and informal) provided such a framework, which when adhered to resulted into increased production of potatoes in the region.

The formal and informal bylaws on improved seed and seed quality, soil and water management, and access to markets in the potato cropping system were developed to ensure occurrence of SCI and benefits associated with improved, sustainable livelihoods and economic development (Makuma-Massa et al., 2020). Nonetheless, effectiveness of these bylaws and implementation strategies were not well understood. Indeed, there was consensus among researchers on the need for effective bylaws to enhance SCI and achieve sustainable

(Sanginga et al., 2010; Mowo et al., 2016; Marambanyika et al., 2017; Yami and Van Asten, 2018). Thus, this study aims to explore the effectiveness of existing formal and informal bylaws in supporting sustainable potato crop intensification in SWU region. Specifically, the study assessed the effectiveness of formal bylaws, informal bylaws, and how individual principles of institutional effectiveness scored against existing bylaws in supporting sustainable potato crop intensification in SWU.

Objectives

This study was geared towards exploring the effectiveness of existing formal and informal bylaws in supporting sustainable potato crop intensification in Southwestern Uganda.

Specific objectives

- i) To assess the effectiveness of existing formal bylaws in supporting sustainable potato crop intensification in SWU.
- ii) To assess the effectiveness of existing informal bylaws in supporting sustainable potato crop intensification in SWU.
- iii) To compare effects of individual principles on effectiveness of existing formal and informal bylaws in supporting sustainable potato crop intensification in SWU.

CONCEPTUAL AND ANALYTICAL FRAMEWORKS

Here, conceptual and analytical frameworks demonstrate how variables influenced each other and the ways they informed the study.

Conceptual framework

The study was based on theories and concepts on SCI by Boserup (1965), North (1990), and Ostrom (1990). According to the theories relating to SCI, it was possible to achieve SCI, while protecting the environment from degradation. In this strategy, achievement of SCI was an ultimate goal. However, doing so did not occur in isolation. The study explored ways through which SCI occurred, involving application of formal bylaws, informal bylaws, and individual principles of institutional effectiveness to increase the effective use of innovations in potato farming using existing bylaws (formal and informal bylaws) to support SCI, as illustrated in Figure 1.

Analytical framework

The effectiveness of existing bylaws to support SCI was

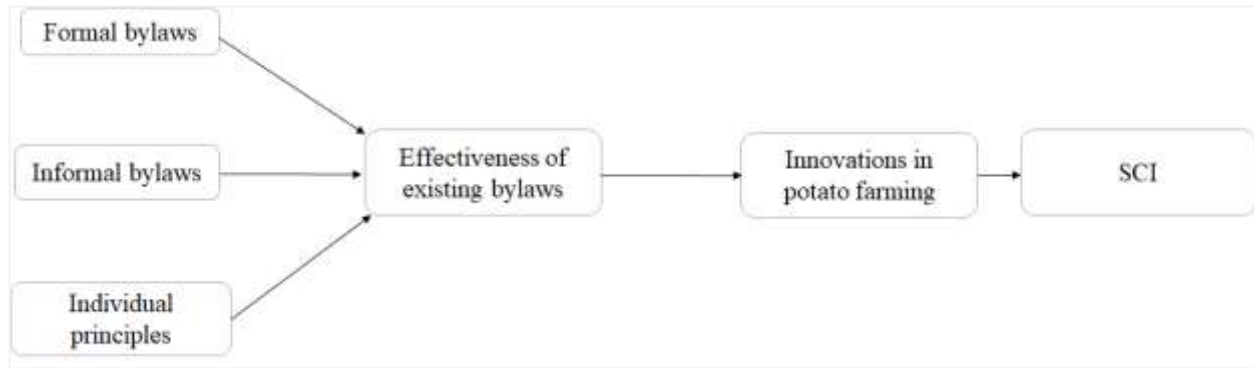


Figure 1. Effectiveness of bylaws in supporting SCI in SWU.
Source: Makuma-Massa et al. (2021).

Table 1. Categorization of the effectiveness of bylaws based on Ostrom's eight principles of effective institutions.

No.	Description of the effectiveness of bylaws	Score range
1	Low (Less effective or failed bylaws)	1-3
2	Average (averagely effective or averagely working bylaws)	4-6
3	High (Highly effective or working bylaws)	7-8

Source: Primary data (2021).

based on this analytical framework and Table 1. According to NIT, bylaws evolved and functioned within an institutional framework, because of the developing or developed structures for achieving set goals. In this study, the set goal for institutionalising potato farming was to achieve SCI, while bylaws played the role of supporting implementation of innovations for intensification of potato crop production. The measurements to determine effectiveness of bylaws were done within an institutional framework, using Ostrom's eight design principles of institutional effectiveness (Ostrom, 1990). This analytical framework was informed by works of Schweik et al. (1997) and Morrow and Hull (1996), which suggested the practice of determining characteristics and measurements of bylaws (formal and informal bylaws) and carrying out assessments to obtain levels of institutional effectiveness, and find out effect of individual principles of effective institutions on effectiveness of existing bylaws on SCI in SWU.

MATERIALS AND METHODS

Here, the materials and methods used were identified, explained, and justified to demonstrate how study findings were obtained with respect to each study objective

Study area

The study was conducted in Kamuganguzi, Bubare, and Muko sub-

counties, located in Kabale and Rubanda districts, SWU (Figure 2). The study sites noted above were selected, because they had greater potential for crop intensification to benefit from growth of the potato sector, in terms of improved and sustainable livelihoods.

Approach

Exploratory case study design was used in this study. It involved seeking in-depth understanding of respondents in real-life setting. In the past decades, there were a number of case studies that analyzed effectiveness of institutional settings using the eight design principles, as indicated in Cox (2010); and Wilson et al. (2013). In this study, both qualitative and quantitative strategies of inquiry and analysis of research information were used. The researchers described understanding of the phenomena, while considering variations in occurrence using questions, such as 'what,' 'why', and 'how' that enable in-depth inquiry and derivation of meaning to draw wealth of conclusions about the study.

Sampling method and sample size

Purposive sampling method was used in the study. The selection of the sub counties was guided by the level of potato crop production, target interventions; use of improved seeds, use of fertilizers, and access to extension services, level of interventions in production and marketing (past or current interventions), market accessibility, and fairly developed physical infrastructure. Selection of the sample was based on applicability of given bylaws to support SCI. For example; Muko sub-county in Rubanda district, Kamuganguzi sub-county in Kabale district, Bubare sub-county in Kabale district, were selected because of soil and water conservation bylaws, improved and quality seed bylaws, market access bylaws, respectively. The researchers considered recruiting farmers, who belonged to groups

Table 2. Effectiveness of formal bylaws (N = 19).

No.	Design principles of effectiveness	Number	%
1	Clear boundaries	0.84	14.92
2	Meet local needs	1	17.76
3	Participation	0.53	9.41
4	Monitoring	0.68	12.08
5	Sanctions and penalties	0.74	13.14
6	Conflict resolution	0.68	12.08
7	Rights respected by external authorities	1	17.76
8	Nested institutions	0.16	2.84
	Total	5.63	100

Source: Primary data (2021).

assessed for extents by which they scored or met more (7-8) principles of effective institutions (high), met moderate number (4-6) of principles of effective institutions (average), and met small number (1-3) of principles of effective institutions (low). The frequency for each score on the scale was established. The researchers added all frequencies, such that each frequency (number), when divided by total number of frequencies, multiplied by 100%, gave respective percent scores for comparative analysis. In this study, the researchers presented the description of scores, range scores, frequencies (respective number of laws, and respective percentages) of the collective sum out of 100% interactive score target for a given bylaw category.

On the other hand, individual percentage score out of 100% was established for each principle of effective institutions, and for each category of existing bylaws (formal or informal bylaws). This provided comparative analytical outcomes for collective behavior (1-unit score/out of total score of all variables \times 100) and individual behavior (individual behavior/out of expected individual score \times 100) for each category of bylaws. Using the same technique, deductions were done to obtain overall score variation for formal (6) and informal (3) bylaws, when total percentage score per category was divided by 100 and rounded-off to the nearest full number. This way it was possible to compare both categories of bylaws.

STUDY FINDINGS

The findings were presented following the order of study objectives.

Effectiveness of formal bylaws in supporting sustainable potato crop intensification in SWU

Formal bylaws were most effective as 17.8% met local needs and ensured that authorities respected local rights. This was demonstrated by Principles 2 and 7, which when met, ensured most effectiveness of formal bylaws in supporting SCI. In terms of the number of principles considered by the formal bylaws, Table 2 shows high consideration (1-7) for principles of effective institutions assessed against the existing formal bylaws. Principles 1-7 were significantly present in formal bylaws, thus, highly effective in supporting SCI in SWU.

The researchers observed that many formal bylaws with six or more of the eight design principles of effectiveness were related to soil and water conservation. The findings from key informants indicated that soil and water conservation were limited to districts of Kigezi region, which practiced them from colonial times until early 1980s. Some of the methods used in the colonial era were mandatory planting of terraces and digging of contours. An International Fertiliser Development Center (IFDC) officer in the area of study affirmed:

"...during that time, implementation was by 'carrot and stick.' These two were used. The carrot in that you would be convinced and the government would provide some incentives that would motivate the farmer to implement the bylaws especially on land use management, crop management, pests and disease management especially with cash crops. Remember they used to schedule days on which the agricultural officer would come with the spray service providers and they would spray coffee... in the 70s and early 80s, there was a lot of coffee in Kigezi here."

Effectiveness of informal bylaws in supporting sustainable potato crop intensification in SWU

The informal bylaws were most effective in terms of the authorities respected rights of local people (36.7%), followed by meeting of local needs (33.2%), with respect to principles 7 and 2, respectively. The effectiveness of informal bylaws general was low, because they significantly met only 2 principles of effective institutions. Henceforth, informal bylaws were most effective in supporting SCI when with regards to principles 7 and 2 of effective institutions (Table 3).

Nearly two-thirds of specific informal bylaws were premised on improved and quality seeds. Indeed, most informal bylaws on SCI were formed as a result of ongoing sensitization and training on modern farming methods for improved seeds and market access among

Table 3. Effectiveness of informal bylaws (N = 22).

No.	Design principles of effectiveness	Numbers	%
1	Clear boundaries	0.14	5.41
2	Meet local needs	0.86	33.20
3	Participation	0.27	8.88
4	Monitoring	0.18	6.95
5	Sanctions and penalties	0.14	5.41
6	Conflict resolution	0.05	1.93
7	Rights respected by external authorities	0.95	36.68
8	Nested institutions	0.00	0.00
	Total	2.59	100

Source: Primary data (2021).

Table 4. Effect of individual principles of effective institutions on existing bylaws.

No.	Design principles of effectiveness	Percent effect on formal bylaws (N=22)	Percent effect on informal bylaws (N=19)
1	Clear boundaries	84	14
2	Meet local needs	100	86
3	Participation	53	27
4	Monitoring	68	18
5	Sanctions and penalties	74	14
6	Conflict resolution	68	5
7	Rights respected by external authorities	100	95
8	Nested institutions	16	0
	% Total	563	259

Source: Primary data (2021).

farmers. More than half of informal bylaws were related to improved and quality seeds. With respect to market access, specific bylaws evolved from recent and on-going efforts towards intensified commercial farming, as well as value-chain addition. Some sections of Bubare Sub-County Natural Resource Management, Agriculture and Marketing Bylaws of 2010, and Kamuganguzi Sub-County Farmers' Association Bylaws promoted market access, contributed to economic growth of potato sector, and strengthened efforts towards sustainable development of the region. The Kamuganguzi FGD on market access bylaws revealed, "...for the point of collective marketing, we have it in our bylaws but we have not yet implemented it; we are looking at starting to sensitise people about the benefits of collective marketing".

Compared effects of individual principles on effectiveness of existing formal and informal bylaws in supporting sustainable crop intensification in SWU

The effects of individual principles of effective institutions were higher on formal bylaws compared to informal

bylaws. Table 4 shows higher scores for all the individual principles of formal bylaws than informal bylaws, while on both categories the scores for principle 7 and 2 were highest. Principle 7 was about authorities respecting the rights of local people, while principle 2 required respect for local needs, respectively.

The study further analyzed the effectiveness of the 41 specific bylaws relevant to SCI against each of eight design principles of effective bylaws. Particularly, findings from FGDs and key informants (KIs) were congruent to both of the aforementioned two principles. The findings from FGDs revealed that farmers who were in farmer's groups and associations often met to discuss and solve farming challenges that commonly and collectively affected them in their areas of residence. For example; setting up and learning from farm demonstrations, controlling soil erosion by digging trenches and water channels to control floods in valleys, ensuring collective storage, and marketing of potatoes.

Thus, it was more empowering and rewarding for farmers to join and work within groups, in as far as implementation of bylaws to support SCI was concerned. Principle 7 was most met with 40 (98%) out of the 41 bylaws. The high score for principle 7 was attributed to

the interface and cooperation between formal authorities and actors at lower levels (farmers). Thus, cooperation among stakeholders increased efficiencies and effectiveness of implementing bylaws to support SCI. It was observed that, in the adoption of formal bylaws, consultations took place among various actors, including farmers and local communities at grassroots level, leaders (district leaders and government representatives), and state attorneys at higher levels. Kabale district KI explained:

“Regarding bylaws, in most cases, someone is facilitating after identifying a challenge. A community member as an individual may not manage because a bylaw should go to all the villages and then the parish level and they sieve out; and then it goes to the sub-county. Then the sub-county reads through and then takes to the state attorney to also read through and make sure that they don’t contradict with the government laws and then they are approved at the sub-county”.

DISCUSSION

The discussions were done according to the order of study objectives, and highlighted results and what they implied to the study, with relational perspectives of other authors.

Effectiveness of formal bylaws in supporting SCI

The effectiveness of formal bylaws was high, because of the significant scores (7-8) on individual principles of effective institutions, with the highest principles being principle 2 (18%) and 7 (18%), and lowest being principle 8 (3%), where total = 6 (100%) scores for formal bylaws, if the expected score for each principle is 1. According to Ampaire et al. (2015), the inability of key actors to take part in policy formulation process undermined performance. As such there was no consensus on implementation of the bylaws. Therefore, the buy-in of all stakeholders was vital to ensure that the implementation of the bylaws moves from the decimal average status to good and (or) excellent levels, which formal bylaws proved most effective in supporting SCI.

The effectiveness of formal was attributed to qualities, such as being more structured and clearly articulated to meet the overall objective of supporting SCI. The formal bylaws were more structured and clearly articulated the objective of being formulated, and implemented. Above all, it (formal bylaws) were supported by the decentralisation policy. The policy has been effective in recent years, following administrative, fiscal, and legislative strengthening from district to local levels by government of Uganda (Muhanguzi et al., 2003). According to them, the policy encouraged participation of local people and proved to be an effective implementation

strategy, similar to the traditional or informal approaches led by elders or cultural leaders. Henceforth, the well-structured implementation of formal bylaws was given more attention than informal category of bylaws. In this regard, the formal bylaws tended to replace, or were a product of *‘metamorphosis’*, or an upgrade from the informal category (of bylaws). Both formal and informal bylaws were linked to the important role of acting as ‘two sides of the same coin,’ in implementation of SCI strategies and technologies as described by Yeboah-Assiamah et al. (2019). The authors emphasized the synergetic nature of the relationship between formal and informal bylaws in influencing behaviour change towards supporting SCI in SWU.

Effectiveness of informal bylaws in supporting SCI

The informal bylaws covered significantly only 2 principles of effective institutions. That is, principle 7 (37%) and 2 (33%), respectively. The coverage for 6 out of 8 principles was significantly very low. This affected informal bylaws implementation in support to SCI especially on the need of maintaining integrity of the environment (Lechenet et al., 2017; Karunarathne et al., 2020; Pimentel and Burgess, 2005; Zhang et al., 2015; FAO, 2014). This was possible through institutional approach and support (Kephe et al., 2020). Institutional approach favored activation of principles 7 and 2, on authorities as regards rights of local people and meeting needs of local people, respectively, to effectively adapt farming practices to climate change and reduce its adverse effects, which in turn, supported SCI in region.

The dismal performance of informal bylaws was explained by the bylaw effects that tended to be indirect, embedded in cultural customs and sometimes rigid norms and values; they were undocumented and at times difficult to monitor. Furthermore, the low effectiveness of informal bylaws in comparison to the formal bylaws was partly attributed to the limited awareness of existing bylaws. A similar study in the same area showed that the level of awareness of regulations was likely to increase compliance with them (Nkonya et al., 2008). A recent study in the same study area showed similarities with this finding, which recognized the important role of informal bylaws in supporting SCI in Uganda (Yami and Van Asten, 2018).

Most of the informal bylaws were limited to particular geographical areas (site-specific) and cultures and, thus, they varied geographically and tended to temporarily operate. It was noted that, when cultures experienced changes with respect to norms and values, informal bylaws changed along with them. This was meant to prepare farming communities to deal with the ever emerging challenges in the potato farming sector. There were various informal bylaws for different farmer communities, limited by lack of awareness about the status of other areas. The importance of informal bylaws

in socio-cultural lives of rural communities was well-documented and profound (Osei-Tutu et al., 2015; Grzymala-Busse, 2010). This recognized the strong influence of NIT in breaking ground upon which models (like Ostrom's eight design principles of institutional effectiveness) worked well to support SCI.

The study findings, further provided a case for formal bylaws, which, as Lund (2006) put it, decentralized formal institutions created an environment, which brought together different political actors, and resulted in a structure of opportunities to enhance negotiation and significant space for stakeholders' engagement. This engagement took place on purpose, involving application of set guidelines to support SCI in SWU. The stakeholder and participatory approaches at all levels of implementation facilitated efficacy of formal bylaws in supporting SCI. For example, they provided training opportunities, awareness, and consensus on set guidelines (or bylaws) for supporting SCI in SWU. Based on the study findings, the dismal performance of informal bylaws was explained by the bylaw effects that tended to be indirect, embedded in cultural customs and sometimes rigid norms and values; they were undocumented and at times difficult to monitor. Informal bylaws strengthened NIT and efficacy measures based on Ostrom's eight design principles of effectiveness of bylaws in supporting SCI. Similarly, Yami and Van Asten (2017) observed the contribution of informal institutions to sustainable resource management by mobilizing social capital, collective problem-solving skills, collective agency, and serving as entry points for interventions. Thinking and acting local proved most effective in mobilizing communities for change as was evidenced in the assessment score for principles 7 and 2 relating to informal bylaws. Most of the informal bylaws were limited to particular geographical areas (site-specific) and cultures and, thus, they varied geographically and tended to temporarily operate. It was noted that, when cultures experienced changes with respect to norms and values, informal bylaws changed along with them. This was meant to prepare farming communities to deal with the ever emerging challenges in the potato farming sector. There were various informal bylaws for different farmer communities, limited by lack of awareness about the status of other areas. The importance of informal bylaws in socio-cultural lives of rural communities was well-documented and profound in terms of influencing behaviors to acceptable levels (Osei-Tutu et al., 2015; Grzymala-Busse, 2010). Henceforth, there was strong appreciation for informal bylaws and confidence in their role in supporting SCI in SWU.

Effect of the individual principles of effective institutions on existing formal and informal bylaws in supporting SCI

The study found greater levels of effectiveness significant for 7 out of 8 principles of effective institutions on formal

bylaws more than informal bylaws (significant for principles 7 and 2 only), and most effective of the principles being principles 2 and 7 on both categories of bylaws. Further, on both categories of bylaws, the principles of effective institutions scored more against formal bylaws 6 (100%) than informal bylaws 3 (100%), or total specific percent scores for formal bylaws (563%) and informal bylaws (258%). The effectiveness of formal bylaws more than the level (of effectiveness) showed by informal bylaws, which was explained by the greater policy emphasis on the former (formal bylaws) than the latter (informal bylaws). In view of principles 2 and 7, Sanginga et al. (2010) indicated how participation of local people in formulation and implementation enhanced effectiveness of both categories of bylaws, as indicated by principles 2 and 7 score on effectiveness of effective institutions. Well-engaged community institutions facilitated the use of natural resources (Husain and Bhattacharya, 2004). In the context of our study, the participation by local communities in the bylaws formulation and implementation processes was important in ensuring SCI outcome. Despite the fact that formal bylaws emerged more effective than informal bylaws in the context of the study, the importance and role of informal bylaws was recognizable. It demonstrated self-drive among farmers to implement bylaws that were aimed at supporting SCI. One of the implications from the study findings was that, pursuing both formal and informal bylaws worked best in comparison to when applied in isolation. The eight principles of effective institutions provided an effective framework for developing and implementing bylaws to support SCI in the region. Thus, in the study, "design principles" implied elements or conditions, with which to account for success of bylaws in supporting SCI.

The findings from assessment done on principle 3, which largely focused on participation of farmers, revealed that bylaws, mainly informal (27%), did not grant as much opportunity as possible to farmers to participate in modification of the bylaws, despite being primary stakeholders in the potato farming sector in the region. On the same note, Melanie (2012) observed that it was one consideration to have bylaws, and another to have them work. Generally, informal bylaws were adopted based on farmers' needs. Thus, they were not liable for modification. Again, it was important to consider the fact that these were socially shared rules, usually unwritten, created, communicated, and enforced within a specific cultural setting, outside the officially sanctioned channels. The change in culture was faced with rigidity, or at most, gradual. The information was passed on from previous generation to the next without much active participation in review and modification, though some people resisted and subverted certain cultural requirements. Thus, the process of making informal bylaws had limitations owing to farmers' participation in formulation and modification processes.

Principle 4 of the eight design principles of

effectiveness, which assessed influence of bylaws on SCI, advocated creating a system for monitoring behavior of group members. Formal bylaws demonstrated a decentralized system of governance, and monitoring structure, which was favorably embraced by LCI, II, III executives. With respect to local council system, Muhanguzi et al. (2003) found that political and administrative system of implementing policies, including bylaws replaced informal or local systems. This compromised the prominent role of informal bylaws in supporting SCI.

Principles 5 (14%) and 6 (5%) against informal bylaws, relating to graduated system of sanctions and conflict resolution effect of the eight design principles were among the least met principles. This was partly explained by the fact that local council courts dealt mainly with sanctions for breaches of formal bylaws. By this arrangement, formal bylaws appeared more stringent and effective than informal bylaws. Even when there was no clear graduation of sanctions on most informal bylaws, many informal bylaws did not have corresponding sanctions or penalties. Sumane et al. (2018) noted, generally, the low consideration for informal bylaws, despite the resilience and sustainability they nurtured in behaviour change processes towards SCI. This reiterated the importance of harnessing the role of informal bylaws in supporting SCI. This was influential in the study and drew consistent inferences from both NIT and Ostrom's eight design principles for effective implementation of bylaws to support SCI in the region.

Principle 8 was the least met on both categories of bylaws (16:0), and comparatively lower against informal bylaws (0%) than formal bylaw category (16%). This principle was about autonomy in governance of the sector. The findings seemed to show that existing bylaws did not acknowledge farmers' input in terms of ideas and knowledge, yet they were key stakeholders in forming and implementing bylaws. Muhanguzi et al. (2003) and Pretty (2003) highlighted the role of strengthening social capital in improving the effectiveness of bylaws by emphasizing collective action, which guaranteed high levels of participation and responses towards SCI. They were the basis of formulation and operationalization of bylaws, which (ideas and knowledge), when fully utilized, supported SCI in SWU. This was attributed to the fact that formulation and implementation of formal bylaws occurred within the decentralized system from district to sub-county level. With many players in SCI, ranging in size, from small to large, there were diverse interests and expectations thus challenges involving different scale of economies that needed to be resolved by utilizing base institutions, or by face-to-face communication. As such, the study foresaw a need for each of these players to self-govern. Agricultural institutions developed strategic relationships with farming communities to support adaptation processes amidst climate change challenges (Kephe et al., 2020). Partnerships encouraged coordination and effective responses towards the need

for crop intensification, through supporting education on farming, provision of quality seeds, and access to machinery (Stavytsky and Prokopenko, 2017). Therefore, for sustainable potato crop intensification to occur, strategic partnership development was inevitable.

Conclusions

The conclusions and recommendations were developed from each of the results' subsections that responded to the two main objectives, existing literature, and theoretical implications on the study.

The general effectiveness of the SCI bylaws among potato farmers was concluded to be at an average level. On the upward side, formal and informal bylaws showed potential to strengthen efforts towards sustainable socio-cultural and political lives of rural farming communities. This study demonstrated the importance and influence of both formal and informal bylaws on potato farming knowledge and practices in supporting SCI as consistently guided and influenced by NIT and Ostrom's eight design principles of effectiveness. Although formal bylaws were more effective than informal bylaws, both categories of bylaws and theories or applied models benefited the potato sector by synergizing each other autonomously. Formal and informal bylaws were significant in fostering SCI and achieving sustainable development, since they helped to create an environment that enhanced adoption of SCI innovations and technologies. Empowerment of farming communities was critical in strengthening of bylaws towards SCI. Ownership of bylaws was made possible whenever farmers participated in formulating, implementing, and monitoring of bylaws to support SCI. It cut costs on prosecution and settling of disputes. This was enhanced by creating awareness on bylaws and developing monitoring skills, which were key in identification of errors, making corrections, and ensuring SCI and steady growth of the sector. It was most sustainable and cost-saving to develop cordial relations among stakeholders (policy makers, implementation teams, bylaw-enforcers and farmers), build consensus, promote participatory actions, and strengthen solidarity among farmers on matters that promoted SCI and growth of the sector, without having to go through unnecessary tensions and adjudications that wasted time and money. The study reinforced the argument by researchers that both informal and formal bylaws played significant roles in the implementation of SCI strategies, innovations, and technological advancement, including use of high quality seeds, appropriate fertilizers, pest control methods, and mechanization of potato farming for growth of the sector and region.

Recommendations

- 1) Participation of key bylaws implementation

stakeholders is key. Buy-in of all stakeholders is vital to ensure that the implementation of the bylaws moves from the decimal average status to good/excellent.

2) The bylaws need be adapted to existing principles of institutional effectiveness in order to realize SCI and development of the region.

3) Strengthen application of informal and formal bylaws need to be synchronized according to emerging complexity of cases, where if one category (formal) fails to deliver desired outcomes, another category of bylaws (informal) are used to appropriately solve disputes, since community has evolved basing on consensual norms that they easily reflect on and resolve emerging conflicts at all levels among stakeholders in the potato-growing region.

4) Empower farmers with necessary information to enable informed decision-making and exercise respective roles and responsibilities with respect to existing bylaws on SCI.

5) Self-governance among farmers by enhancing capacity through development trainings to ensure good governance, sustainable utilization of resources, financial accountability, effective monitoring and reporting, as well as policy development and implementation.

CONFLICT OF INTERESTS

The authors have not declared any conflict of interests.

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