

Using a Systems Approach to Improve the Lives of Women Smallholder Farmers in the Northern Mountainous Region of Vietnam

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Abstract

In response to gender gap and persistent poverty in the Northern Mountainous Region (NMR) of Vietnam, this paper employs a “systemic approach” to determine appropriate livelihood strategies for improving the quality of life of women small farmers in the North-western sub-region. Special focus is given to the commercial development of indigenous vegetables (IVs) – a previously determined potential product for livelihood improvement of the target group. An in-depth literature review provided many insights into the context and the issue under consideration. It became evident that traditional problem solving approaches and linear thinking, which tend to solve immediate problems such as low yield and limited market access, would often lead to uncoordinated and ineffective solutions. The systems approach employed in this study provided a holistic view of the system as a whole and the interrelationships amongst all factors and determinants of the quality of the lives of the women farmers. A systems model was developed to help determine potential leverage points for systemic interventions, while it was shown how multi-actor collaboration is a prerequisite to the development of an overall systemic management plan for coordinated actions towards the end goal and sustainable future of the women and local communities.

Keywords: Indigenous vegetables; Livelihoods; Markets; Production practices; Quality of life; Women smallholder farmers.

1. INTRODUCTION

Vietnam is an agriculture-based country in the South East Asia (Bosch *et al.*, 2015; Ha *et al.*, 2015c). The agricultural sector provides the main sources that determine the livelihoods of the majority of its population (Ha *et al.*, 2015a). Farming systems are typically small and fragmented with about 10 million small farms across the country (Hazell & Rahman, 2014, pp. 69-70). Vietnamese women farmers were found as the main labourers who are

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responsible for most of farming, housework and childcare tasks within a family (Ha *et al.*, 2015b, 2015e). A significant level of discrimination against women has also been reported, particularly in the Northern Mountainous Region (NMR) (Trinh, 2014).

The NMR is the poorest region in Vietnam where there is a high ratio of ethnic minorities associated with conventional production practices and limited literacy levels. Ethnic minorities account for 14 percent of the whole country's population, but makes up approximately 30 percent of the residents living in poverty (IDA, 2009). In addition, overreliance on natural resources has caused forest degradation, soil erosion and poor agricultural yields (Gomiero *et al.*, 2000).

Additionally, inappropriate development policies (Gomiero *et al.*, 2000), inadequate land management (ACIAR, 2009), poor access to resources (ACIAR, 2007; Pham *et al.*, 2011), food insecurity (Trinh, 2014), limited market access (Castella *et al.*, 2005), production risks due to harsh environmental conditions and inefficient production practices (Trinh, 2014) have been found as other contributing factors to the difficulties that the local residents are facing.

For these reasons, improving the lives of local people, particularly the disadvantaged women, in this region is a significant challenge. This is due to the multidimensional obstacles in an environment of interwoven relationships amongst different factors, such as those related to environment, economics, social issues and culture. A systems approach is therefore required to provide a broad picture of the entire system to help understand the interplays of different factors influencing their lives.

Recently, utilisation and commercialisation of indigenous vegetables (IVs) have been promoted as one of the “pro-poor solutions” for smallholder farmers around the world (Trinh, 2014). This is because IVs generate positive impacts on household incomes (Chagomoka *et al.*, 2013), food diversification (Keatinge *et al.*, 2010), agricultural biodiversity, sustainable production systems (Ebert, 2014), nutritional security (ACIAR, 2014), health benefits (Ebert, 2014), and empowerment of women (Clement *et al.*, 2014), particularly gender equity (Tenkouano *et al.*, 2012).

In the NMR, IVs have also been identified as potential produce for commercial development that could help empower women and improve their lives (Braidotti, 2008)

In this light, a project on developing profitable and sustainable vegetable production systems in north-western Vietnam (2014-2018) is currently underway, which is funded by the Australian Centre for International Agricultural Research (ACIAR, 2012b). This project focuses on enhancing access to lucrative markets and production management practices to support ethnic minorities, particularly women, who are the main labourers in the cultivation of IVs (Braidotti, 2008).

However, given the above-mentioned complex situation of multiple determinants of the quality of lives of women and local residents in the NMR, the purpose of this paper is to explore the main determinants of the women's lives and their interrelationships for defining appropriate systemic livelihood strategies, by using a systems approach.

In contrast with traditional problem solving approaches and linear thinking that address immediate problems in isolation, the systems approach have been proven its value and validity in solving complex problems in a variety of contexts around the world, including Vietnam. The approach ensures addressing the root causes of perceived (visible) problems towards sustainable outcomes and long-lasting impacts (e.g. Bosch *et al.*, 2007; Bosch *et al.*, 2013a; Bosch *et al.*, 2015; Ha *et al.*, 2014, 2015a, 2015d; Nguyen & Bosch, 2012; Nguyen *et al.*, 2011).

2. LITERATURE REVIEW

2.1. Drivers for livelihood improvement of women smallholders through commercialisation of IVs

Development of IVs has been stated as a “pro-poor” solution for improving rural livelihoods in many developing countries, particular in mountainous regions where women are the main farming producers (Chagomoka *et al.*, 2013; Fonseka *et al.*, 2008). There is a number of driving factors for promoting the production of IVs around the world.

Commercialisation of IVs creates a high potential for additional income for small farmers, especially for resources-poor women in developing countries (Ayanwale & Amusan, 2014). Due to the nature of semi-wild crops, IVs require fewer inputs (fertilizers and pesticides). In addition, they show high adaptability to harsh environments (Ayodele *et al.*, 2011; GFAR, 2005) and resistance to pests and diseases (Fonseka *et al.*, 2008). The crops have stable yields

and short production cycles which are more profitable than other traditional crops such as cereals (Ayanwale & Amusan, 2014; Chagomoka *et al.*, 2013; Sugino, 2008).

IVs also contribute to food security and have many other health associated-benefits. IVs provide a high source of minerals (Calcium, Vitamin A and Iron) and a variety of nutraceuticals, which are essential for vulnerable groups in poor countries in Africa and the Asia-Pacific region. Many people in these regions, especially pregnant women and malnourished and stunted children, have limited access to food sources. IVs are considered as primary food sources for these groups (Mahlangu *et al.*, 2014; Onyango, 2010).

In addition, the recent raised awareness on human health has led to an increasing demand for clean produce around the world (Ha, 2014b, 2014e; USAID & HortCRSP, 2014; Weinberger & Msuya, 2004), particularly for vegetables in Vietnam (Ha & Nguyen, 2013; Ha, 2011, 2014a, 2014c, 2014d). IVs would provide an opportunity for small farmers to address the demand owing to its high resistance to pests and less requirements of inputs (Fonseka *et al.*, 2008). Therefore, more commercial development of IVs is needed to meet the market demand, that will also increase farm income, particularly for women farmers (ACIAR, 2012a)

Conservation and commercialization of wild and indigenous plant resources have been integrated to development strategies in many countries such as South Africa (Jaeger, 2010; Mahlangu *et al.*, 2014), Australia and Vietnam (ACIAR, 2012a). There are hundreds of well-defined plant species of IVs but a few has been utilised as “standard” vegetables in the world’s markets (Ojiewo *et al.*, 2013). IVs are mainly collected from the wild or are cultivated in small volumes in home gardens for self-sufficiency of rural households (ACIAR, 2007; Ayanwale & Amusan, 2014). Hence, commercial production of IVs would conserve and enrich the genetic diversity of indigenous plant resources, while at the same time could increase the income of small farmers.

2.2. Barriers to commercial development of IVs

Despite the drivers for livelihood improvement through the commercialisation of IVs, there are some barriers to IVs production such as traditional production practices, small landholdings (Weinberger & Lumpkin, 2007), subsistence production habits (Baloyi, 2010; Weinberger & Msuya, 2004), mainly rain-fed production systems (Dittoh *et al.*, 2012),

manual labour inputs (Ayanwale & Amusan, 2014) and inappropriate harvesting techniques (Chadha, 2009; Newman, 2011; Trinh, 2014). These have been reported to be significant hindrances to large-scale (semi)-commercial and sustainable production of IVs to meet market demands in terms of quantity, quality and timely delivery.

Inappropriate cropping structure is another barrier to income improvement of smallholder farmers in many regions in Vietnam, including the NMR. Traditional habits focus on intensive cultivation of cereal crops that is much less profitable than vegetable crops. Profits gained from monoculture of vegetables are 4.45 and 1.78 times higher than those of paddy and rotation systems (Ha *et al.*, 2015d). A study by Huong *et al.* (2013) in northern Vietnam also confirmed that permanent vegetable production helps to increase the income of rural households. Although demands for labour are higher, it can be fulfilled by family labour. In the NMR, inappropriate land use management has been reported as one of the main causes of persistent poverty (Clement & Amezaga, 2013; Trinh, 2014).

Furthermore, limited market access is evident, which hampers livelihood improvement strategies of farmers in rural areas (ACIAR, 2007; Ha, 2014b; Pham *et al.*, 2011). Poor infrastructure and market access limit women as the main sellers to access market information, resulting in underestimated value of IVs, high price fluctuations (Chagomoka *et al.*, 2013; Sachdev, 2012) and insecure income of IVs producers (Ayanwale & Amusan, 2014).

3. APPROACH AND METHODS

The literature review was conducted via a desktop study of secondary data from various published sources (journal papers, reports and webpages) of different international and domestic organizations, such as ACIAR, Vietnam Women's Union, Vietnam Academy of Agricultural Sciences, and Provincial Departments of Agriculture and Rural Development, etc.

Main variables and their interrelationships were synthesized and used as inputs for developing a causal loop diagram (CLD) using Vensim[®] software (Ventana[®], 2011). The CLD helps to develop a “picture” that shows systemic relationships among different factors within a complex system (Maani, 2013). The developed model was used to determine all the determinants of the quality of life of the target group, their “*patterns of relationships*” and

potential “*leverage points*” for systemic interventions to improve their lives with a special focus on sustainable development and commercialisation of IVs.

The *patterns of relationships* represent how different variables are interlinked and types of feedback loops (reinforcing and balancing) are formed (Bosch *et al.*, 2013b). The *reinforcing feedback (R) loop* represents positive feedback, showing “growing or declining actions”. In contrast, the *balancing feedback (B) loop* indicates negative or counteracting feedback, which “seeks stability or return to control, or aims for a specific target” (Maani & Canava, 2007).

The *leverage points* are defined as “points of power” or “places within a complex system (a corporation, an economy, a living body, a city, an ecosystem) where a small shift in one thing can produce big changes in everything” (Meadows, 1999).

4. RESULTS AND DISCUSSION

4.1 Current situation of women smallholder farmers and indigenous vegetable production in the NMR

A recent study by Trinh (2014) showed a high potential for improving livelihoods of women small farmers in the NMR through promoting (semi-) commercial production of IVs due to a number of advantages. Those include availability of family labour, high adaptability with local conditions, high resistance to pests, less requirements of inputs, short production cycle and thus quick cash return.

Nonetheless, the above study found that the current cropping patterns in the NMR are not favourable for commercialisation of IVs. A high proportion of arable lands is used for the production of staple food crops such as rice and maize (Trinh, 2014). While these crops would contribute to “on the spot” food security, their profitability is much less than that through the production of vegetables (Huong *et al.*, 2013). Yet, for long-term benefits and sustainability of the production systems, further studies on cropping structures, market access and other supporting mechanisms in the NRM would be needed. For instance, Linh *et al.* (2013) found that rice monoculture reduces soil quality. Rotation of crops would help address this issue, whereas crop yields increase and lesser amounts of fertilisers and pesticides are required. Dien and Van (2014) developed some production models for local crops (e.g. bean, pumpkin, red peanut, etc.) in the NMR, in which some criteria such as relevance, indigenous

knowledge, economic efficiency, climate change adaptability and sustainability were included to warrant the success and sustainability of these models. In addition, Tiwari *et al.* (2008) substantiated that adoption of vegetable farming brings about many benefits for the poor and women farmers in the highlands of Nepal compared to conventional cereal cropping systems. The alternative system helps to improve socio-economic conditions via enhanced food security, raised income, access to resources, rural employment and improved social status. However, appropriate cultivation practices, institutional mechanisms and marketing support are required to ensure sustainability and profitability of the production system.

There is a number of issues that impede commercial development of IVs in the NMR. Social characteristics of IVs female farmers induce some constraints. Women farmers were found to be the main actors in production and sales of IVs (Braidotti, 2014; Pham *et al.*, 2011; Smith & Newman, 2011). However, this group has a limited education background. A high ratio of ethnic women cannot communicate in standard Vietnamese language, which could be seen as one of the major hindrances to commercial production of IVs (Trinh, 2014). Minot *et al.* (2006) affirm that capacity building could facilitate economic activities, either for salary-paid jobs (off-farm employment) or managing their own farm businesses in the northern uplands of Vietnam.

Additionally, there is a high degree of gender inequality in the region that hinders livelihood improvement of women. Their “traditional burdens” of various domestic tasks and heavy physical work (fetching water and collecting firewood) cost their time and efforts in improving farm productivity. These also hamper their participation in community activities and access to extension services, social welfare and skill training opportunities (Son *et al.*, 2011). The traditional conception of women belonging to kitchens rather than attending schools is another sign of discrimination against women (Trinh, 2014). In contrast, men have more opportunities for education and off-farm jobs with higher income than women (Ayanwale & Amusan, 2014; Minot *et al.*, 2006). Moreover, lack of ownership of properties (Nguyen, 2012) would also make it difficult for women to access credit, mainly due to the lack of collaterals. This is consistent with the results of FAO (2011) regarding various aspects of gender gap in developing countries. According to this organization, if women have equal access to productive resources as men do, they could improve farm yields by 20-30%. Nghiem (2010) suggests improving educational levels of women and creating a balance between on-farm and off-farm activities, would be potential solutions for livelihood

improvement. In addition, Ha *et al.* (2015c) found that quality and relevant training on crop and livestock production (the major sources of income of rural women) for enhancing yield is one of the important interventions for improving their livelihoods.

Because of small landholdings and large household sizes, besides investing on high value produce, diversifying household income through the use of available family labour could generate additional income sources via off-farm employment activities (Minot *et al.*, 2006).

Limited market access is amongst the prominent issues that the women who produce IVs are facing. This is caused by various factors, namely, production constraints (ACIAR, 2007), high transaction costs (distant markets and language barrier) (Minot *et al.*, 2006), lack of on-farm infrastructure (poor post-harvest and transport facilities) (Newman, 2011), inconsistent production (small quantity and poor quality) (Holmer *et al.*, 2013) and low bargaining power (low educational level and limited market information) (Newman, 2011). Although consumers of IV have a high trust in its safety and an appreciation of strong taste, they have limited knowledge on IVs' health-related benefits and ways (recipes) to use them (Newman, 2011). Thus, raising consumer awareness would be a way to promote the sales of IVs (Newman, 2011; Pham *et al.*, 2011).

Strict requirements of the emerging modern markets (packaging and branding to ensure quality fresh produce) are also considered as another market constraint for the IV producers in the NMR (Pham *et al.*, 2011). Whereas, cultivation of IVs takes place mainly in rain-fed production systems, poor quality inputs (Minot *et al.*, 2006), subsistence production habits, and fragmented production, etc. (Trinh, 2014) have posed various challenges and risks for the local producers. These have made companies and supermarkets hesitant to sign supply contracts (Trinh, 2014).

The IVs market is relatively new in Vietnam. To meet the requirements of buyers, a quality control system and further research on post-harvest techniques would have to be developed and applied (Newman, 2011). This is consistent with findings of Ha *et al.* (2015d) in another province in the northern midland region. Commercialisation of IVs requires large-scale production (ACIAR, 2012a) in accordance with enhanced market linkages via contract farming (Nham, 2012) to ensure secure market access and income for the women farmers.

It has therefore become clear that the women are facing various challenges which are multidimensional. The factors determining their livelihoods and lives are interwoven and interdependent, and they are related to many other stakeholders. Promoting commercial production of IVs alone is not sufficient to guarantee improved livelihoods and quality of life of the women. Many other related issues such as production constraints, land use management, market actor linkages, consumers' awareness, supporting mechanisms, and cultural barriers, should be addressed in a coordinated manner. The section below describes the complexity and interrelationships amongst the above mentioned factors to identify appropriate systemic interventions.

4.2. Systems modelling for improving livelihoods and the quality of life of the women small farmers

Based on the information and main variables gathered, a causal loop diagram (CLD) or systems model was formulated (Figure 1) that provides insights of the interrelationships and interconnectedness between different factors and major determinants of the quality of life of the women smallholder farmers in the NMR. A strong focus was given to promoting commercialisation of IVs to secure their livelihoods and to improve their lives. This can also be a “*generic model*” that applies for any marketable produce that can bring about potential positive livelihood development for the target group in the region.

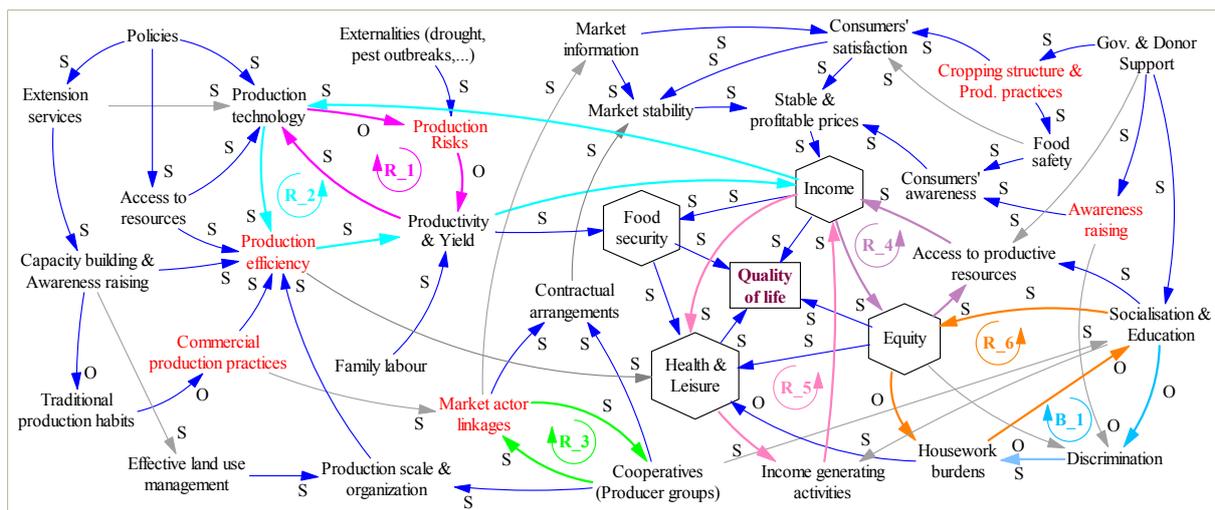


Figure 1 – CLD modelling on improving the quality of life of women small farmers in the NMR. Notes: S – same direction; O – opposite direction; R – reinforcing (loop); B – balancing (loop). Red coloured variables are potential leverage points for systemic interventions.

It turned out through the model that income, food security, health and leisure, and gender equality are four main determinants of the women's quality of life. Promoting commercialisation and improving market access for IVs are only part of the potential interventions to improve the quality of their lives (Figure 1).

To deal with the “*food insecurity*” issue, improving “*productivity and yield*” of agricultural produce and raising “*income*” would be needed. The former is determined by three factors, including the reduction of production risks, enhancement of production efficiency and utilisation of family labour (Trinh, 2014).

“*Production efficiency*” turned out to be an important factor that would help address the food shortage issue through improving productivity and yield. The efficiency can be enhanced by better policies from central and local governments regarding advanced production technologies and practices, and improved access to resources (credit, production infrastructure, and production services, etc.). Capacity building through the extension network could help to improve production efficiency. Likewise, awareness raising would also change perceptions and thus production practices (Figure 1). This is consistent with the findings of Ha *et al.* (2015c) and Bosch *et al.* (2015) with regards to the need for enhancing capacity, and Ha (2014b) and Ha *et al.* (2015d) concerning awareness raising for small farmers in northern Vietnam. According to Minot *et al.* (2006), capacity building could facilitate both on-farm and off-farm economic activities. This could address the current poor income and poverty levels of the local people in the NMR, especially the ethnic minorities (Nguyen, 2012).

The efficiency can also be improved via a larger production scale and more organized production (Figure 1). These factors could be addressed by forming producer groups and more effective land use management, which is currently inappropriate ((Clement & Amezaga, 2013; Trinh, 2014). As such, advantages of economies of scale would be utilised to produce collective actions for reducing production costs, while meeting market demands in terms of supply volumes, consistency of quality and uniformity and timely delivery (Ha *et al.*, 2015d). This could significantly reinforce market linkages and enable contract farming.

“*Improving income*” could be evaluated as the second priority after the basic level of need (food security) is met. Income of the women farmers could be raised when production yield is improved and more stable and profitable prices are obtained. The latter is mainly determined

by enhanced market linkages via contract farming (Nham, 2012), raised consumer awareness (Newman, 2011; Pham *et al.*, 2011), and more appropriate cropping patterns and production practices (Trinh, 2014) (Figure 1). These cannot be implemented by the women farmers themselves, but require support and interventions by the local government and other institutions/organisations through the development of more efficient policies, promotion of commercial production practices, raising an awareness for both producers and consumers, formation of producer groups and stronger engagement of the market actors.

Since gender inequity was found to be a prominent issue that impede livelihood development of the women in the NMR (Minot *et al.*, 2006; Nguyen, 2012; Son *et al.*, 2011; Trinh, 2014), interventions to promote “*equality*” are therefore highly essential. According to FAO (2011), if women have improved access to productive resources, they can improve farm yields substantially. Improving educational levels would also improve their livelihoods (Nghiem, 2010). However, this would be a long-term objective. Various studies have found that promoting “*socialisation*” and “*informal capacity building*” together with “*raising income*” for the disadvantaged women can enhance gender equality through improved knowledge levels, social status, independence, decision making power, reduced domestic violence, less discrimination and more housework shared by men (Bosch *et al.*, 2015; Ha *et al.*, 2015a, 2015b, 2015c; IFAD, 2011, 2013; Lapar *et al.*, 2006). Therefore, improvement of their health and more time to participate in other income generating activities would be expected (Figure 1).

“*Health and leisure*” of the women were evaluated to be influenced by production efficiency, food security, income, degree of gender equality and burdens of domestic chores (Figure 1). Interventions to improve production efficiency and reduce domestic workload were said to significantly improve women farmers’ health and save more time for them to participate in other income generating activities. In turn, raised income would help the women to better access to healthcare services (Bosch *et al.*, 2015; Ha *et al.*, 2015c).

The causal relationships amongst all the variables within the system formed some *reinforcing and balancing loops*. To improve productivity and yield of the IVs, locally adoptable production technologies and sustainable practices should be introduced to the local farmers, which could reduce production risks (away from traditional production habits) and the nature of rain-fed systems and soil erosion in the highlands. The increased productivity and yield would facilitate farmers to embrace production technologies and practices (*Loop R_1, Figure*

1). Recent trials of minimum and zero tillage, and intercropping between staple food crops and vegetables or cover crops have resulted in positive effects such as improved soil fertility, reduced soil erosion, improved crop yields and income (ACIAR, 2009; Ha *et al.*, 2011). The improved income would create an incentive and affordability of the farmers to further adopt improved production technologies and practices, leading to improved production efficiency and yield (*Loop R_2, Figure 1*).

As discussed above, forming producer groups is needed to address market demands and enable contractual arrangements. This can enhance market linkages and willingness of agribusinesses to sign supply contracts with local farmers through producer groups. When the market linkages are strengthened, more stable and profitable product prices can be obtained for the participating members, which would be a further incentive for farmers to join producer groups (*Loop R_3, Figure 1*).

In addition, as discussed, an increase in income for the women will enhance gender equality. The latter leads to improved access to productive resources and thus further improved income (FAO, 2011) (*Loop R_4, Figure 1*). The raised income would help the women to better access healthcare services and adopt improved production practices and devices which could save their time significantly (Bosch *et al.*, 2015; Ha *et al.*, 2015c). The relationships formed another reinforcing loop (*R_5, Figure 1*).

Socialisation could further contribute to gender equality and thus reduced housework burdens for the women (Bosch *et al.*, 2015; Ha *et al.*, 2015c; IFAD, 2011). This would create more time and opportunities for them to participate in social and learning activities (*Loop R_6, Figure 1*). In turn, discrimination against women would be reduced and thus a lessening of domestic chores (*Balancing loop B_1, Figure 1*).

Based on the developed systems model, to improve the quality of life for the women smallholder farmers, there are some potential “*leverage points for systemic interventions*”, namely, cropping structure, production practices, awareness raising, production efficiency, production risks and market actor linkages (Figure 1). Systemic interventions taken to influence these factors would potentially create a significant shift in improving their livelihoods and quality of life.

6. Conclusion

The paper has presented an overview on drivers and barriers to the commercialisation of IVs as a potential livelihood development option for the women smallholder farmers in the NMR. It was followed by a systems analysis to provide a broader picture of all the factors that influence the quality of their lives. It became clear that immediate and uncoordinated solutions to improving production yields and market access for the IVs cannot ensure the success of the women's livelihoods and improved rural lives. A systems approach is needed to understand the causal relationships and interplays amongst all the factors that determine the quality of their lives.

The approach also helped to determine potential leverage points for systemic interventions, while multi-actor collaboration is required to develop an overall systemic management plan for coordinated actions towards the end goal and subsequently the sustainable future of the women, rural households and local communities.

The formulated CLD could be seen as a generic systems model, not limited to the IVs. It can be applied to any potential produce that could bring potential impact to livelihood improvement of the target group.

This study has certain limitations. Detailed baseline data of the current state of the women farmers and market situations as pointed out by Trinh (2014) were not presented as evidence to support the findings due to copyright issues of the funding body. Therefore, information used in this study was collected from all published sources. Further studies with active participation of the target group and all relevant stakeholders are required to better understand the insights of stakeholders' viewpoints, and to define the women's priorities of feasible livelihood options for developing a master systemic management plan.

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