Sustainability Indicators for Natural Resource Management & Policy

Working Paper 6

Indicators Of Success/Failure and Sustainability of Selected Farming Systems In Uganda

Godfrey Bahiigwa, Isaac Shinyekwa, Rosetti Nabbumba and Gloria Kempaka

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The effects of policy and institutional environment on natural resource management and investment by farmers and rural households in east and southern Africa

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Development and Project Planning Centre, University of Bradford, UK

Centre for Agricultural, Food and Resource Economics

Institute for Development Policy and Management, University of Manchester, UK

Economic Policy Research Centre, Makerere Campus, Kampala, Uganda

Agricultural and Rural Development Research Institute, University of Fort Hare, South Africa

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BACKGROUND TO PROJECT AND WORKING PAPER SERIES

This paper is one in a series of working papers prepared under a research project on *"The Effects of Policy on Natural Resource Management and Investment by Farmers and Rural Households in East and Southern Africa"*

This is a collaborative research project implemented by Agricultural Rural Development Research Institute[1], the Development and Project Planning Centre[2], the Economic Policy Research Centre[3], the Institute for Development Policy and Management[4] and the Centre for Agricultural, Food and Resource Economics[5]. The Project is supported by the UK Department for International Development (DFID) under their Natural Resources Policy Advisory Department (NRPAD) research programme. The project commenced on 1 July 1998 and is to run for a three year period.

The overall goal of the project is for it to assist in the development of more effective, equitable and sustainable participatory management of renewable natural resources in sub-Saharan Africa. The purpose of the research is to identify the links between the sustainability of different farming systems and agricultural policy in South Africa and Uganda.

This is to be achieved through a series of case studies in Uganda and South Africa which will examine 'the success or sustainability" of small and large scale systems from a range of perspectives including: farmers, communities, scientist, planners and policy makers. This will include the identification of criteria used to assess the "success" of these systems, and the adoption or development of verifiable and measurable indicators of this "success". The impacts of different policies on the degree of success of these systems will be assessed in terms of their effect on farmers' management of, and investments in their natural resources, and in the development of sustainable rural livelihoods.

This paper *'Indicators of Success/Failure and Sustainability of Selected farming System in Uganda'* is the sixth in the series of the project working papers. It describes the research process and presents results from the first phase of this research-the stakeholders analysis. The stakeholders analysis is a practical application of the use of indicator framework reviewed in working paper 1 of this series in the development and use of sustainable indicators. Emphasis is on local indicators as perceived by the local stakeholders. It goes further to develop a methodology for assessing the applicability or manifestation of the sustainable rural livelihood (SRL) concept- a framework and approach to analysing the links between rural livelihoods and natural resource management reviewed in working paper 2 of this series.

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For more details on the project contact either:

- *Godfrey Bahiigwa Economic Policy Center*
  Makerere University Campus, 51 Pool Road P.O BOX 7841 Kampala-Uganda
  Tel: 256-41-540141. Fax 256-41-541022, email: bahiigwa@eprc.or.ug, *or:*

- *David Howlett, DPPC, University of Bradford*
  Bradford, West Yorkshire, BD7 1DP
  Tel +44 1274 235286, fax +44 1274 235280, email: d.howlett@bradford.ac.uk, or

- *Phil Woodhouse, IDPM, University of Manchester*
  Crawford House, Precinct Centre, Oxford Road, Manchester, M13 9GH
  Tel +44 161 275 2801, fax +44 161 273 8829, email: phil.woodhouse@man.ac.uk

The project website can be viewed at: http://les.man.ac.uk/ses/research/CAFRE/indicators/home1.htm

[1] University of Fort Hare, South Africa
[2] University of Bradford, UK
[3] Makerere, Uganda
[4] University of Manchester
[5] University of Manchester

THE AUTHORS

Godfrey Bahiigwa is the project coordinator and a senior research fellow at Economic Policy Research Centre, Kampala Uganda.

Isaac Shinyekwa is the Project Manager at Economic Policy Research Centre, Kampala Uganda.

Rosetti Nabbumba is a former young professional at Economic Policy Research Centre and currently a Policy Analyst, Poverty Monitoring & Analysis Unit, Ministry of Finance, Planning and Economic Development Kampala Uganda.

Gloria Kempaka is a young professional at Economic Policy Research Centre, Kampala Uganda.

1 INTRODUCTION

In Uganda poverty eradication is at the center of policy debate. The government has developed a comprehensive development framework, the Poverty Eradication Action Plan (PEAP, 2000). Among its objectives are broad and sustainable economic growth, and income growth among the poor, mainly subsistence farmers. As a strategy to raise incomes of the poor subsistence farmers, the government has developed the Plan for Modernization of Agriculture (PMA, 2000) which is aimed at fulfilling the economic and income growth objectives of the PEAP. The PMA will focus on transforming subsistence agriculture to commercial agriculture. The PMA strategies for transforming agriculture include raising farm level productivity so that subsistence farmers can increase the marketed share of production. However, despite the focus on agriculture as the way to fight poverty, there is still a lot that needs to be understood about subsistence farmers. What they consider important in their farming decisions, how they are influenced by the conditions in the farming system, what support they receive, what makes one succeed or fail, and the institutional mechanisms that influence their behavior. What are the local indicators of success or failure? What makes one farm sustainable and not another? How do the local perceptions relate to the expert or known indicators? These are some of the questions that the joint research project between Economic Policy Research Centre and the Universities of Manchester and Bradford is trying to answer. It aims to develop a set of local indicators of success/failure and sustainability that can be monitored over time to assess the impact of policies and institutional changes on the farming system.

The joint research project is being conducted in two study areas: Mukono and Mbarara districts. The former falls mainly in the coffee-banana agro-ecological zone, although the northern part of the district has cassava/finger-millet and livestock farming systems. The latter district falls in two agro-ecological zones: montane and pastoral. From each of the study areas, three study sites (sub-counties) were selected. Details about each of the study sites are presented later in the paper. Initial fieldwork for the study was conducted during January to March 2000.

Research for the project develops a methodology for assessing the applicability or manifestation of the sustainable rural livelihood (SRL) concept of development. The SRL framework is an approach to analysing the links between rural livelihoods and natural resource use and management. The thinking behind SRL is that the rural poor have diverse assets from which they derive their livelihood. The assets are referred to as capitals. The SRL concept and capitals are discussed in more details by Woodhouse *et al* (2000) in Working Paper No. 2 of the project [*A Framework for Research on Sustainability Indicators for Agriculture and Rural Livelihoods*].

This paper describes research process and presents the results from the first phase of the project. It provides the basis for site selection and presents the participatory methodologies used to describe and understand the various farming systems in the study sites. These include the seasonal calendar, flow diagrams and venn diagrams. The approach to stakeholder identification is also presented. Perceptions of stakeholders on the determinants of success/failure and sustainability in farming systems are presented in form of indicators. The second phase of the study will attempt to measure the indicators as identified by the stakeholders and compare them with the external (expert) indicators. The paper also presents the asset status frameworks and results from individual stakeholder visits.

The asset status framework describes what stakeholders consider to be the characteristics of the "worst" (lowest) and "best" categories of the five capitals – natural, physical, financial, human and social. The stakeholders describe the characteristics of the capitals considering three dimensions- access, endowment and ownership – in their local communities. This information is obtained from workshops involving key stakeholders – primary producers, service providers, community leaders, and community based organizations. Individual stakeholder visits are helpful in trying to ascertain the characteristics given in the group discussion. The farms visited are selected and scored based on criteria given by the workshop group. Levels of the various forms of capital for each of the households visited are presented as asset polygons which give a visual representation of differences in capital endowments.

The preliminary findings of this research are revealing and important to the PMA which is a cross-sectoral framewok for poverty eradication. The results reveal the weak capitals (based on the lowest score) that need intervention in order to enhance the livelihoods of the farming based households.

2 METHODOLOGY

This section presents the methodology used in the first phase of the research. It was designed to determine the perceptions of different stakeholders of farming based livelihood systems, the criteria they use in making this assessment, and the status and access that primary stakeholders have to livelihood assets. The methodology has five major steps.

- Understanding the farming based livelihood systems and identification of different stakeholders in the system.
- Identification of the perceptions of success/failure of farming-based livelihood systems.
- Description of livelihood assets status, and the range of livelihood outcomes[6]
- Classification of stakeholder functions, interests, importance and power/access to livelihood assets/capitals and,
- Identification of local stakeholder or 'community level' indicators of success/failure of the farming systems.

The outputs from the application of this methodology were:

- Description of the identified farming systems.
- Identification of different groups organizations/individuals with stake in the farming systems of the case study areas. This included formal and informal groups and organizations such as: farmers and households; non-governmental organisations; community based organisations; government agencies; private and commercial organizations.
- Description of the interests of these different groups, and the identification of key stakeholders who actively got involved in the research.
- The perceptions of the success/failure of the farming systems of the different stakeholders. This included the identification of core issues and challenges to natural resource management in the case study areas.
- Development of livelihoods asset status framework of farming systems.

[6] Livelihood outcomes are what people seek to achieve through their livelihood strategies which include more income, increased well-being, reduced vulnerability, improved food security and more sustainable use of the natural resource base.

- Identification of local indicators of key stakeholders to assess/monitor the success of farming systems of the case study areas.

2.1 Participatory methods

An average number of 30 participants was drawn from the above categories for each site to participate in a two-day workshop. One day visits were made to 3 primary stakeholders and 3 secondary stakeholders. Sub-county extension workers were instrumental in identifying and selecting stakeholders who participated in the workshop. The composition of participants slightly varied from site to site owing to different farming systems. They included farmers, input suppliers, traders, local extension workers, non-governmental organisation representatives, local leaders and processors. Four types of participatory methods were used in the study during the workshop phase-seasonal calendar, flow diagramming, venn diagramming and semi-structured interviews.

- The seasonal calendar, a participatory rural appraisal technique, was used to chart the main climatic variables (mainly rainfall) and the important farming productive activities throughout the year (two cropping seasons).
- Flow diagramming was done to show inputs and their sources, output and their outlets
- Venn diagramming was done to represent the different stakeholders associated with the functioning of the system.
- Semi-structured interviews were conducted that comprised predetermined guided topics. New questions and insights arose as a result of the shared discussions and visual representations of the discussion and analysis.

2.2 Classification of stakeholders and stakeholder visits

Classification was intended to categorise primary and secondary stakeholders[7]. This was aimed at obtaining a brief description of the stakeholder/organizations in order to understand how they engaged with the system (their importance to the system) and what control they had over key capitals. Since obtaining comprehensive lists of primary stakeholders from secondary stakeholders was not possible, respective district agricultural extension staff assisted in identifying primary stakeholders. Ranking of importance and the power of influence of stakeholder to the functioning of the system was done qualitatively. The following terms in descending order described importance: vital, important, optional, or, marginal. High, moderate, low/marginal, variable or unknown described the power or influence over capitals by stakeholders. The information generated from the visits was summarized in asset/cobweb polygons and a matrix table.

[7] Primary stakeholder were individuals, households or organisations directly involved in significant production from the natural resource base of the system concerned. Secondary stakeholders were individuals, households or organisations providing tangible and intangible inputs or dealing with outputs or otherwise supporting the functioning of the system.

3 INDIVIDUAL STUDY SITES

This section describes the six study sites individually, giving their location, agro-ecological characteristics economic, activities and key stakeholders to the particular farming system.

3.1 Nazigo Sub-county - Mukono District

Nazigo sub-county, the first site, is located in the central part of Mukono district. Nazigo sub-county lies in an agro-ecological zone referred to as the intensive coffee-banana farming system. The climate in the area is influenced by Mabira Forest Reserve and Lakes Kyoga and Victoria and has two rainy seasons (March-May and September-November). However, the months of April, October and November experience more rain than the other months of the rainy season. The sub-county has two dry seasons in June and December-February. These seasonal patterns influence the events and activities of the farming system throughout the year. Coffee and bananas are the major crops grown, beans are inter-cropped with coffee and bananas.

The activities involving coffee growing in Nazigo sub-county follow the sequence described below. Farmers plant coffee following the patterns of the rainy season. This is followed by weeding, application of herbicides, desuckering, application of coffee husks to fertilize the soil, harvesting, drying the coffee and finally selling it. The activities involving banana growing in Nazigo sub-county sequenced as follows. Farmers prepare the land and dig holes during the dry season and then plant bananas during the rainy season. This is followed by weeding, mulching, pruning, applying herbicides and pesticides. When the bananas are mature, the farmers harvest and sell them.

Inputs for coffee production were mainly from hardware and farm input supply shops, the transport industry and own farms. These included farm implements, fertilizers, coffee seedlings, land, bicycles, motor-vehicles, motor-bicycles, labour and stores. Other inputs included extension advice, rainfall and sunshine. Outputs from coffee production included wet and dry coffee. The wet coffee was either sold at farm gate or dried and sold to processors. Other products from coffee were firewood from the stems and branches and coffee husks. The input output relationship of the farming system was illustrated through a flow chart and a typical example is given in Annex 3 for maize production in Nyamarebe sub-county.

Several important organizations/individuals in the coffee-banana farming system of Nazigo sub-county were identified. These included non-governmental organizations, produce buyers, coffee buyers and processors, government departments and input suppliers. The extension workers, coffee and banana buyers, coffee processors and farm input supply shops were considered by the farmers to be the most important secondary stakeholders. Details of stakeholder perception of the important organizations and individuals in the system was illustrated through venn diagramming and an example is given in Annex 4 for Ntenjeru sub-county.

3.2 Ntenjeru Sub-county - Mukono District

Ntenjeru sub-county, the second site, is located in the southern part of Mukono district near the shores of Lake Victoria (Kamanyire, 2000). The climate is influenced by Mabira Forest

Reserve and Lakes Kyoga and Victoria. The sub-county has two rainy seasons (February-May and August-December) and two dry seasons (June-July and January) which greatly influence the activities in the farming system. Ntenjeru Sub-county lies in a vanilla-coffee farming system with bananas forming an important part of the system. Towards the shores of Lake Victoria, at Katosi landing site, fishing is an important component of the system. Vanilla, a crop which has been grown for about 10 years in the area is a very important crop in the farming system.

Hardware and farm input supply shops, livestock farms, extension department, coffee factories and fellow farmers constituted major organizations supplying inputs in vanilla production. The inputs for vanilla include labour, extension advice, rain, shade, farm implements, vanilla seedlings, coffee husks, animal manure, bicycles, motor-bikes and vehicles (pick-ups).

Vanilla is harvested twice a year between July-August and December-January. This stage is also very labour intensive and requires a lot of care if the quality is to be high. Vanilla has one major output in form of fresh vanilla which is sold and the rejects are crudely dried and used for home consumption (tea flavour) and for preparing local brew largely for sale. Unlike other crops whose residues are either used as fodder, fuel, or recycled in the gardens, the plant in its old age simply dries away leaving no residues. Vanilla depletes the soil very fast and therefore requires addition of nutrients to maintain soil fertility. It requires sufficient shade and support to be able to grow well. The input output relationship of the farming system was illustrated through a flow chart and a typical example is given in Annex 3 for maize production in Nyamarebe sub-county.

Processing and marketing vanilla is entirely done by buyers because it is delicate to process to obtain a good quality product. Processing vanilla takes about four to five months to complete depending on the weather. There were two major active buyers and processors of vanilla, namely, Uganda Vanilla LTD with a market share of 80% and Mukono Vanilla Spices and Horticultural Co-operative Society, with 20%. In the past, vanilla was exported to Canada and the USA, but marketing the product is facing problems. Since 1992, prices paid to farmers have dropped from Shs.7,000 to Shs.3,000 per kg of fresh vanilla.

The coffee-vanilla farming system in Ntenjeru had been reached by many secondary stakeholders which included individuals, non-governmental organizations, government departments, cooperative societies and traders. Its is important to note that without vanilla buyers and processors, it would be difficult to grow the crop. Details of the stakeholder perception of the important organizations and individuals in the system are given in Annex 4.

3.3 Bbaale Sub-county - Mukono District

Bbaale sub-county, the third site, is located in the northern part of Mukono district and extends up to Lake Kyoga. The sub-county lies in the plantain-millet-cotton agro-ecological zone and cassava/millet and livestock are the main economic activities. Bbaale sub-county experiences two rainy seasons between March-May and August-November. The rains are separated by a four months dry period. The soils are generally low in fertility and are vulnerable to erosion especially during heavy rains.

Crops grown are annuals namely millet and cassava, that can withstand the long dry periods. Cassava growing in Bbaale sub-county has activities spread over a period of 6-12 months. The activities start with clearing of the land of weeds/trash of the previous season, followed by ploughing. This is done twice a year at the beginning of the year and in July-August periods. Planting is also a two season activity, done after the above during the months of March –May and July to October. Weeding is done twice a year depending on when cassava is planted. For a good crop yield, the farmers remove some of the branches leaving 4-6 per stem depending on the spacing that was used during planting. The biggest problem confronted by cassava farmers is wild animals (especially wild pigs) which eat the crop while it is still in the garden. Harvesting cassava is done throughout the year. Fresh cassava is either used for household consumption or sold and the excess is dried. The bitter variety is harvested, cut, dried and stored for selling between December and February. In this form, it is pounded into flour and consumed as a thick paste with soup.

The livestock reared include cattle, goats, sheep, chickens and pigs although cattle keeping for beef/milk is the main economic activity. Both dairy and beef cattle are kept by farmers on small, medium and large scales. Most of the cows are local breed with a small number of cross breeds in the system. During the dry season (January-March) the most important activity is looking for and moving the cows to places with water and pasture. During the rainy season, the animals are treated, vaccinated and dewormed. Although spraying is done throughout the year, it intensifies during the rainy season due to increased number of vectors. Milking is a continuous event although it peaks during the rainy season, the time when excess milk is processed into ghee(local butter). Selling cows takes place throughout the year, however, the months of March-April and November-December experience a boom in the business attributed to the Easter and Christmas holidays. Castrating of bulls is carried out between March and November.

Most of the inputs were purchased from the local markets and general retail shops because specialized shops lacked in the area. Farmers operating on a large scale could afford to purchase inputs from big towns like Kampala and Mukono. Among the most important local input suppliers were the neighbours, the households themselves, the blacksmith and hunters. Hunters and black smiths who, respectively, hunted and made hunting equipment were identified and considered as very important in sustaining the cassava system by attempting to reduce the adverse impact of the wild pigs on cassava. The outputs of commercial significance from the dairy/beef system were mainly milk and meat, while for the crops, it was fresh cassava, cassava flour and millet flour.

Bbaale is located far away from urban centres and has not been reached by many organisations (secondary stakeholders) compared to Nazigo and Ntenjeru sub-counties. The majority of those mentioned were individuals who had had a significant impact on sustaining the system. World Vision which is the only external organisation in the area rated very important in the stakeholder workshop has a relatively small component of its programmes directly handling agriculture compared to its involvement in social development.

3.4 Nyakayojo Sub-county - Mbarara District

Nyakayojo sub-county, the fourth site, is found in Rwampara county in the south western part of Mbarara district. The sub-county lies in Montane agro-ecological zone and is in a predominantly banana farming system although livestock farming is an important component

of the system. Other crops grown in the sub-county include maize, millet, beans and potatoes (Kamanyire, 2000). There are two rainy seasons (March-May and September-December) and two dry seasons (January-February and June–July). Most farming activities are closely influenced by the seasonal patterns. Banana cultivation requires keen agronomic practices like mulching, pruning, weeding, application of manure and desuckering (leaving 3 suckers) in order to obtain good yield. Crops like beans are intercropped with bananas, but sometimes bananas are grown as a pure stand. Harvesting of bananas goes on throughout the year with the months of February, June, July and August registering higher harvest which leads to a fall in prices. This is also partly because bananas are highly perishable.

Nyakayojo sub-county had been reached by many secondary stakeholders. For the banana farming system, the buyers, shops selling farm implements and other input suppliers were the most important secondary stakeholders. Inputs in banana production included farm implements, pick-ups, bicycles, land, labour and other variable inputs like fertilizers, pesticides, herbicides, banana suckers, manure, staking poles and mulch.

Outputs from the banana farming system include fresh bananas, bananas for ripening, and bananas for making juice, alcohol and a spirit called waragi. Other products from banana stems and leaves include manure, ropes, residues for mulch, cattle feed, dry leaves for house thatching, mats and fresh leaves for various domestic uses.

3.5 Bubare Sub-county - Mbarara District

Bubare sub-county, the fifth site, is found in Kashari county in the central western part of Mbarara district. The sub-county lies in the Pastoral agro-ecological zone and falls in a dairy/beef farming system. Dairy/beef farming forms the biggest component of the livestock farming system and other livestock reared include goats, sheep, pigs and chickens. In addition to this, crops like maize, beans, potatoes and millet are grown especially for subsistence purposes (Kamanyire, 2000). There are two rainy seasons (March-May and August-December) and two dry seasons (June-July and January-February) that influence the farming activities throughout the year. The farming activities include planting and weeding pastures, construction of paddocks, cleaning and clearing water points[8], deworming and vaccinating cows, milking, controlling ticks, castrating bulls and selling beef/milk.

Input sources include blacksmiths, local markets, retail shops, the transport industry, animal drug shops, hardware shops and own farms. They supply a wide range of inputs like farm implements and equipment, motor-vehicles, motor-cycles, bicycles, land, labour, fencing poles, barbed wire and animal drugs. Other important inputs include rain and extension advice. There were two main outputs of commercial significance from the beef/dairy farming system, that is, meat and milk (milk products as well). Other products included skin and hides[9] from which drums and carpets were made, cow dung used in building, making baskets and manuring gardens.

Bubare sub-county had been reached by many secondary stakeholders ranging from individuals, government departments and non-governmental organizations. Secondary stakeholders who played a very significant role in the farming system were input suppliers,

[8] Water points include dams, pools and wells.
[9] Drums and carpets are only local products but skins and hides sold for industrial processing have several products e.g. shoes, bags, belts and etc.

the veterinary extension worker, the Dairy Corporation that bought the milk and traders who bought the cows.

3.6 Nyamarebe Sub-county - Mbarara District

Nyamarebe sub-county, the sixth site, is found in Ibanda county in the north-western part of Mbarara district. The sub-county falls in the montane agro-ecological zone and in an annual crops farming system (Kamanyire, 2000). Beans and maize form the biggest component of the farming system. Other crops like millet, potatoes, groundnuts, bananas and coffee are grown. In addition to this, livestock rearing is carried out on a small scale and the animals include cows, goats, sheep, pigs and chickens.

There are two rainy seasons (March-June and September-November) and two dry seasons (January-February and July-August) that influence the farming activities throughout the year. Maize and beans are grown twice a year and they are in most cases intercropped. The activities in the two seasons that occupy farmers are clearing the gardens of the residues of the previous season, ploughing the land (some times done twice), selecting seeds, planting, weeding, building stores and granaries, buying sacks, harvesting, threshing and selling.

The input sources in the maize/beans farming system included hardware shops, farm input supply shops, the transport industry and own farms. These supplied a wide range of inputs including farm implements, bicycles, motor-vehicles, fertilizers, labour, seeds, land and pesticides. Input suppliers and the buyers of produce were considered to be very important in the system by farmers. Outputs and products from the system included fresh maize, dried maize, maize flour, chicken feed, local brew, beans and the residues from both crops used as manure in gardens and firewood (maize stocks). Details of inputs and outputs in the system are given in Annex 3.

Participants identified a wide range of organisations which included local self-help groups, local and central government departments, an international non-governmental organisation, input suppliers and buyers of produce that were very important in their system.

4 LOCAL PERCEPTIONS OF SUCCESS/FAILURE AND SUSTAINABILITY

As one of its objectives, this research aims at developing a set of indicators of success/failure and sustainability of farming systems which can be used to assess or monitor the impact of policy and institutional changes on these systems. This leads to a clear distinction to be made between the success and sustainability of systems. A farming based system may not necessarily be considered sustainable even though it may be successful. Whereas success of systems may be viewed from a short-run perspective, 'sustainability is when the system can cope with and recover from stresses and shocks and maintain or enhance its capability and assets both now and in the future, while not undermining the natural resource base' (Carney, 1998, adapted from Chambers and Conway, 1992). The rapidly growing body of literature on the use of sustainability indicators has not evaded different definitions of what an indicator[10] is and the primary roles of indicators. Varying opinions exist on the use of quantitative versus qualitative indicators, and on who is to identify indicators (Rigby *et.al,* (2000). Several sets of methodological frameworks or guidelines have been identified for the measurement of sustainability indicators at farm or community levels. These have all tended to come from an approach focussed on sustainable agriculture and sustainable land management. The options can broadly be categorized as external/expert on scientific basis, communities themselves and a combination of both. This research seeks local community indicators to be combined with the external/expert indicators for measurement in the major survey following this phase.

Obtaining local perceptions of success/failure and sustainability was very challenging because the methodology had to be continually reviewed and refined from the first to the fourth site in order to get the required information. The information in this section is presented in a format following the evolution/application of the methodology from one site to the next during the study. Therefore, the indicators of success/failure and sustainability are presented according to the evolution of the methodology. Those indicators from the first three sites are not ranked while those from the last three sites are ranked. This is because part of the study was to develop a methodology and therefore the process had to allow for its evolution.

In Section 3 the initial stages of this phase of the study (seasonal calendar, flow diagramming, venn diagramming and semi-structured interviews) have been briefly discussed and some samples of the associated outputs presented. What follows is a review and discussion of the methods and outputs from the application of the next stages of the methodology to identify perceptions and indicators of success/failure and sustainability in the 6 study sites. More details of the evolving methodology used to obtain this information are presented alongside outputs from various sites. The increased detail in this section reflects the fact that the previous stages were largely a means to understand the farming system studied in order to be able to derive the information presented in the rest of this paper.

[10] Rigby *et. al,* (2000) argue that, although there is a rapidly growing literature on the use of sustainability indicators, there are different definitions of an indicator. They identify Gallopin (1997:14) who defines an indicator as ' a parameter…a measure…a statistical measure…a proxy…a value…a meter or measuring instrument…a fraction…an index…something…a piece of information…a single quantity…an empirical model…a sign'. Others include Smyth and Dumanski (1993) who define an indicator as 'environmental attributes that measure or reflect environmental status or condition of change', and Glen and Pannel (1998) who argue that an ' indicator is a quantitative measure against which some aspects of policy performance or management strategy can be assessed.

4.1 Nazigo Sub-county

Identification of local indicators from the workshop was not done at Nazigo site, however, the enumerators identified several local indicators from the criteria matrix that was developed. The criteria matrix refers to the matrix of the five capitals against the three dimensions of sustainable development i.e equity, productivity and sustainability[11]. The indicators identified were classified into local indicators of productivity, equity and sustainability as shown below.

4.1.1 Local indicators of productivity

Rainfall; soil type and quality; rate of deforestation; quantity of pasture; rate of weed growth, pest and disease infestation; availability of farm implements and inputs; availability of infrastructure; level of education; labour availability; seminars/training per unit period; application of modern farming methods; quantity of disposable assets; disposable income; asset status; and information flow.

4.1.2 Local indicators of equity

Ownership and accessibility to land; population density; variability of market location; access to improved seeds; road quality; access to storage and post harvest handling facilities; extension worker/farmer ratio; access to hired labour; access to health services; poverty status; family size; competition; disposable assets; high versus low value crop production; gender disparities; and cultural factors.

4.2.3 Local indicators of sustainability

Trends in pests and diseases; environmental degradation; nature of agronomic practices; incidence of drought; security of land tenure; quality of additives/inputs; availability, quality and nature of infrastructure; availability of farm implements; availability of extension services (demonstration centers); family size; food basket; population density; extension worker/farmer ratio; taxation rates; income; and prices of farm produce.

4.2 Ntenjeru Sub-county

At Ntenjeru sub-county, the methodology for ranking indicators had not been refined and therefore, it was difficult to rank the indicators. The following were given by the participants as local indicators of success/failure and sustainability.

4.2.1 Indicators of a successful/failing farm

The colour of the crops which arises from the care given, presence /absence of diseases, the state of and quality of soil; physical appearance of the crop; crop yield trends; nature of agronomic practices e.g. pruning, mulching, time of weeding, spacing of the crops; price trends; degree of adaptability to new technology by farmers and quality and variety of seeds planted.

[11] This matrix was contained in the original version of the methodology. However, after trying it on the first site , it was found to be difficult to fill because of difficulties associated with interpretation of the dimensions especially equity. For subsequent sites, the matrix was abandoned because it was not yielding any more information.

4.2.2 Factors that ensure sustainability

Seeking additional sources of income/capital e.g. by selling chickens, avocados, oranges; ensuring crop continuity; consulting one another concerning new ideas; attending seminars/workshops to obtain advice from extension workers, for example, on crop rotation; building stores where food can be kept and sold during drought/famine; growing dependable crops in all seasons; adapting new innovative farming methods; and adding organic fertiliser to the soil to maintain its nutrient quality.

4.2.3 Measures to be taken to ensure sustainability

Maintenance of soil fertility through organic fertilization; attending seminars to acquire extension knowledge; planting improved and better quality seeds; paying farmers promptly; applying modern methods of agriculture; and conserving natural resources e.g. forests, swamps.

4.3 Bbaale sub-county

At Bbaale sub-county, participants were able to identify indicators of a failing and succeeding farm. However, these were stated in neutral, negative and positive forms (mixed) which made ranking impossible and meaningless. Since it was not possible to rank the indicators, the exercise was abandoned. The ranking procedure needed to be reviewed, refined and streamlined in preparation for the next three sites in Mbarara District.

4.3.1 Indicators of success/failure (mixed)

- *Garden preparation:* Does not deep plough the land; does not plant in lines; broadcasts seeds; mixes young and old crops.
- *Poor farming methods:* Presence of soil erosion; lack of ridges in the garden; bushy and unweeded garden; planting in the wrong season; utilising extension knowledge; lack of fallow to rest the land; degree of nutrient recycling; lack of crop rotation; mixing many crops in one garden.
- *Growing inadequate amount of food for the family.*
- *Keeping records on the farm to follow animal multiplication and yield trends*.
- *Cattle indicators:* Lack of treatment for animals; not giving them salt; the amount of milk produced; the stocking rate in relation to carrying capacity; absence of ticks; appearance of the animals e.g. animal with protruding bones or nice looking; and the type of breed one rears.

4.4 Nyakayojo Sub-county

From the experience in the previous three sites, the EPRC team reviewed and refined the ranking procedure and tested it in Nyakayojo sub-county. The criteria and indicators for success and failure were solicited and ranked separately. The ranks were limited to 4 levels of importance, that is, 'most important', 'very important', 'important' and 'least important'. This does not mean that the unranked indicators were not important. Participants were first asked to give the indicators of success/failure and sustainability separately. These were listed on a board visible to everyone, then, each participant was asked to select and rank four most important indicators. Reading from Annex 1 Table 1, 12 participants (56 %) voted for size of the banana bunch as the number one indicator, 3 participants (14 %) voted for the appearance of the banana plantation as the number one indicator of success and so on out of the 21 participants. Likewise, 12 participant (36%) voted for spacing of the crops as the number one indicator, 8 (24%) voted for size of the banana bunch as the number two indicator of success and so on out of 33 participants. The third and fourth ranks of success can be read in the same

way. The procedure was followed for indicators of failure and sustainability. Below are the results of indicators of success/failure and sustainability. Further details are presented in Tables 1-3 in Annex 1A.

4.4.1 Indicators of success

Considering the number of votes, the size of the banana bunch, which had 56 % was the most important indicator of a successful banana farm. Participants ranked spacing between banana plants in the garden as the number two important indicator of a successful farm. Presence of soil and water conservation technology was number three and the appearance of the bananas was number four indicator of a successful farm. Other unranked indicators were agronomic practices, planting selected varieties and regular harvesting of bananas. These results are given in Table 1 in Annex 1A

4.4.2 Indicators of failure

Poor agronomic practices were considered by the farmers as the most important indicator of a failing farm. The others in their order of importance (descending) included small size of banana bunch, close spacing, and presence of many suckers and pseudo-stems as shown in Table 2 in Annex 1A. Other unranked indicators were presence of soil erosion, poor appearance of crops, with yellow leaves and inter-cropping beyond what is recommended by extension workers.

4.4.3 Indicators of sustainability

The participants were of the view that to sustain banana farming in Nyakayojo, soil fertility was the most important indicator. The others in descending order of importance were continuous good banana husbandry, and the farming being the main source of income. Other indicators such as good weather and availability of market were also considered important given the percentages they represented as shown in Table 3 in Annex 1A.

4.5 Bubare Sub-county

The success in ranking indicators experienced at Nyakayojo sub-county site made ranking of indicators at Bubare much easier. Emphasis was on livestock rearing. Sections 4.5.1-4.5.3 give a summary of the results, however, details can be obtained from Tables 4-6 in Annex 1B. The ranks were expanded from 4 level at the previous to 5 levels of importance, that is, 'most important', 'extremely important', 'very important', 'important' and 'least important'. This was because participants felt that five levels were more accommodative than 4 levels. Below are the results of indicators of success/failure and sustainability.

4.5.1 Ranked indicators of success

Participants considered a farm well endowed with both natural and physical capitals to be the most important indicator of success. The other ranked indicators in descending order of importance were health of the animals, the milking environment and keeping of records of farm activities. The unranked indicators were means of transport for milk to collection centers and sufficient, well paid and motivated labour. Details are in Table 4 in Annex 1B.

4.5.2 Indicators of failure

Inadequate endowment of both physical and natural capitals was considered number one indicator of failure. The health of the animals, the milking environment, insufficient knowledge and inadequate labour in descending order were the other indicators of failure. Details are in Table 5 in Annex 1B.

4.5.3 Indicators of sustainability

According to the participants, sustainability of their farming system was most importantly determined by keeping livestock as the major source of livelihood. Extension advice and advice from fellow farmers was ranked second among the indicators that determine sustainability of livestock rearing. There was however tying up of indicators for the fourth and fifth ranks. Therefore, good animal husbandry practices, availability of good pastures, acquired experience over time and ones status in society were equally important indicators of sustainability. Details are in Table 6 in Annex 1B.

4.6 Nyamarebe Sub-county

Ranking of indicators for Nyamarebe sub-county was done successfully with emphasis on annual crops and coffee. The results are summarized below in sections 4.6.1-4.6.3 and details can be read from Tables 7-9 in Annex 1C.

4.6.1 Indicators of success

The appearance of the garden was considered by the participants to be the number one indicator of a successful farm. This involved a clean, well maintained garden. Recommended spacing and planting in lines was the number two indicator. In descending order of importance from the third to the fifth; planting improved seeds, possessing post harvest storage facilities (store/granary) and presence of soil and water conservation technology were the other indicators. Details are in Table 7 in Annex 1C.

4.6.2 Indicators of failure

Inability to weed, and poorly maintained garden was ranked by the participants as the most important indicator of a failing farm. Lack of water and soil conservation mechanisms was ranked number two. Poor agronomic practices was ranked three. Lack of storage facilities (granary/store) was ranked number four. The indicator ranked fifth was lack of interest in the crop farming business by the farmer. Details are given in Table 8 in Annex 1C .

4.6.3 Ranked indicators of sustainability

Soil fertility was ranked the most important indicator of sustainability of the farming system. The others in descending order of importance were sufficient amount of land, utilization of indigenous/traditional knowledge, availability and access to market for produce and having good, all weather roads. Therefore, the degree of endowment of natural capital and presence of infrastructure were the indicators that were considered essential determinants of sustainability of the farming system. Details are in Table 9 in Annex 1C .

4.7 Conclusion

Identifying indicators for measurement is important, however, determining how the information is to be used, especially at the farm and community levels, is equally important. Rigby *et. al*, (2000) reveal that examples of work linking indicators to policy and institutional development at the farm, community (village) levels or district levels are rare. This position does not however paint a pessimistic picture of the use of indicators. Work done by Howlett (1996), cited in Rigby *et. al*, (2000) serves as a starting point and can be a complement to the Plan for Modernization of Agriculture. Accordingly, indicators can be used to:

- Develop capacity and commitment of farmers towards more sustainable land use, and to allow farmers to evaluate their own practices.
- Provide simple diagnosis of problems and improvements to farming practices, and development of appropriate research and extension activities.
- Assess and monitor the spatial and temporal sustainability of different farming systems, and to use this for evaluation, prediction, planning and management of these systems by farmers, researchers, extension agents and planners.
- Enhance or improve the relationship between the researcher, farmer and extension agent, and through this to encourage farmer participation, the incorporation of indigenous knowledge, and ultimately to an increase in the adoption of improved technologies.

5.0 THE ASSET STATUS FRAMEWORKS FOR THE SIX STUDY SITES

The purpose of the asset status framework was to provide a means of measuring access to, utilization and/or endowment status of the 5 capitals of the Sustainable Rural Livelihood approach for a particular a farming system. As mentioned in Section 1 the SRL framework identifies five basic types of capital that comprise the assets of farmers: natural, physical, financial human and social. Woodhouse *et.al*, (2000) argue that sustainability of livelihood strategies of individuals or households depends on access, use, and development of different types of assets. The asset status framework developed in this study and discussed below draws a lot from the SRL Framework which is also the most recent development of an approach to the analysis of the links between livelihoods and natural resources (Carney, 1998).

For each of the six study sites, an asset status framework was developed with the intention of defining the 'highest' and the 'lowest'[12] asset status for each of the five different capitals. This was to characterise the range of the endowments of the 5 capitals in each location. Participants were guided to identify the number of categories that were in their community for each capital that in turn determined the allocation of scores. The scores were allocated as follows: two identified categories with score 25 and score 75; three identified categories with score 17, score 50 and score 83; and four identified categories with score 13, score 38, score 63 and score 88. The research team thought it helpful (from the second to the sixth site) to ask participants to give percentage estimates of farmers in their sub-county in each of the categories. This was to give a rough picture of the composition of farmers in each site according to the developed asset status framework. In this way, it was possible to derive a picture of not only the range of capital endowments but also an approximation of the

[A]cross the sites, most of the participants preferred to use the words- best and worst to highest and lowest. However, for this report the words highest and lowest are used.

distribution for the site. In the absence of records of the scale of operation of farmers, this served the purpose of getting an understanding of the composition of farmers in terms of the scale of operation for each site. Table 1 below summaries this information.

Table 1. Percentage estimates of farmers by category for each capital

Site	**Capital**	**Category/Score**			
		percentage	percentage	percentage	
Ntenjeru	Natural	50	30	20	
	Physical	50	30	20	
	Human	40	30	20	10
	Financial	40	30	20	10
	Social	25	65	10	
Bbaale	Natural	60	30	10	
	Physical	60	35	5	
	Human	65	25	10	
	Financial	80	15	5	
	Social	30	60	10	
Nyakayojo	Natural	20	50	30	
	Physical	15	65	20	
	Human	30	60	10	
	Financial	30	65	5	
	Social	15	80	5	
Bubare	Natural	5	70	25	
	Physical	30	60	10	
	Human	30	60	10	
	Financial	40	50	10	
	Social	90	10		
Nyamarebe	Natural	20	50	30	
	Physical	20	70	10	
	Human	20	70	10	
	Financial	40	50	10	
	Social	10	80	10	

Generally, the asset status frameworks exhibited a lot of similarities across the sites, with differences arising from needs of each farming system, the scale of operation of farms and the location of sites (agro-ecological zones).

5.1 General comments

- Participants clearly understood the concepts of the different capitals and gave characteristics and examples of each capital in the context of their local community.
- Stakeholders were encouraged when describing the best and worst category of each capital type to ensure that there were actually farmers with those characteristics in the area - so it really represented real farmers in the study site.

- Participants identified three categories for each capital except in Nazigo and Ntenjeru where four categories were identified for social, financial and human capitals and in Bubare where two categories were identified for social capital.
- Participants were required to give characteristics for the highest and the lowest categories. However, in some instances, participants volunteered to give characteristics of the middle category/categories and they were included in the asset status framework.
- Except for Nazigo sub-county, percentage estimates were assigned to the different identified categories by the participants in relation to their local community. These estimates give a rough picture of the composition of farmers in a given sub-county according to the developed asset status frameworks Overall, majority of farmers were in the middle category.
- Social capital throughout the six sites elicited more characteristics than the rest of the other capitals.

A typical example of an asset status framework is presented for Bbaale sub-county in Annex 2.

Below are specific details about each of the capitals as analyzed across the six sites.

5.2 Natural capital

Natural capital is a term used for the natural resource stocks e.g. land, coastal resources, clean air, resources such as trees, pastures and wildlife upon which people rely. It is clearly important to those who derive all or part of their livelihoods from resource-based activities, in this case farming. Below are the characteristics of natural capital from the six sites.

- Generally for all sites, the lowest category was characterized by farms with poor quality-stony acidic soils, the presence of soil erosion, lack of soil and water conservation mechanisms, located in swampy and hilly areas, inaccessibility of water, lack of trees on the farm, poor agronomic practices etc.
- The highest category was identified with good soil and water conservation mechanisms, enough trees in the garden, located near water sources, cultivation on gently sloping and flat land.
- Trees were very important shade providers at sites where coffee and vanilla were grown and where cattle were reared.
- Farmers in the lowest category were seen as never having sufficient land for cultivation and the land area per household identified for this category varied from 1 to 2.5 acres. Some farmers rented land and others borrowed from neighbours.
- Farmers in the highest category were considered to have sufficient amount of land with a minimum of 10 acres of land per household.
- Bubare sub-county was different from other sites in terms of land. The lowest category had at least 4 acres of land per household and the highest had 50 or more acres of land. The main activity in the sub-county is cattle rearing which tends to require a lot of land compared to crop agriculture.

An assessment of natural capital shows that access to, endowment and utilization of resources was skewed in favour of a very small portion (less than 15 % according t the estimates of the stakeholders) of the households in the area. The nature of access rights was mainly private ownership with common ownership (on pasture rangelands) existing in some of the livestock farming areas. Rental and contested access, were at a bare minimum. The perception of

success of farmers seemed highly influenced by the scale of operation and degree of ownership of other capitals, especially financial and physical capitals.

5.3 Physical capital

Physical capital comprises the basic infrastructure and physical goods that support the farming system or agricultural based livelihoods. It is that capital created by economic production. It consists of changes the physical environment that help people meet their basic needs and to be more productive. It includes infrastructure such as roads, irrigation works, farm equipment and tools, electricity supply, good communication and access to information etc. Across the sites, physical capital was generally the same with differences arising from the needs of each farming system.

- Food stores and granaries were very important in Bbaale and Nyamarebe sub-counties where most of the food grown is stored, but were of little importance in Nyakayojo where bananas were grown. Bananas are perishable and there is no technology for their long-term storage.
- In the cattle keeping sites of Bbaale and Bubare, stakeholders attached a lot of importance to fencing their land as compared to Nyamarebe, Nazigo and Ntenjeru where crop farming was predominant. Nyakayojo which had both animal and crop husbandry exhibited both characteristics in terms of fencing.
- The farm implement identified (such as hoes, machetes, slashers, axes and forked hoes) were the same across all the sites, but varied with scale of operation and the financial capacity of the farmer.
- Households in the highest category were identified as having better means of transport ranging from bicycles to motor-vehicles as compared to households in the lowest categories barely having a bicycle.
- Households in the highest category had permanent houses with good toilets and sanitation facilities compared to households in the lowest category with poor/collapsing houses and very poor quality toilets.

Farm equipment used by the majority of farmers were traditional tools limited in terms of the ability to tap full productive potential of the land resource. This is because farmers can not afford to buy and use better farm implements due their weak financial position. This phenomenon has been asserted by DFID, (1998) who argue that lack of infrastructure, adequate shelter and producer goods is a core dimension to poverty and without the help of tools and equipment, people's full productive potential cannot be realized. Therefore, financial capital plays a very significant role in determining the stock of physical capital that a household has which in return determines the degree of enhancement of natural capital.

5.4 Human capital

Human capital is constituted by the quantity and quality of labour available. It represents the skills, knowledge, capacity to work and good health that together enable people to pursue different livelihood strategies and achieve their livelihood objectives. At a household level, therefore, human capital is determined by household size, education, skills, and health of household members. There were general similarities for human capital across the sites, the contrast arising from farmers belonging to the highest and the lowest categories.

- Farmers in the highest category were seen as those who attended seminars and applied extension knowledge while those in the lowest category across the sites never attended seminars or implemented extension knowledge.
- The children of farmers in the highest category went to good boarding schools because they could afford to pay school fees while those in the lowest category went to local, low standard day schools.
- Due to their financial capacity, farmers in the highest category for all the sites were considered as able to afford hired labour on a permanent basis and casual labour during peak seasons in addition to household labour. Farmers in the lowest category in most cases used only household labour and were themselves hired elsewhere to work for others.
- Households in the highest category had enough to eat and could afford better medical facilities compared to households in the lowest category who rarely had balanced diets.
- There was interaction among farmers in the highest category-visiting other farmers to learn from them. On the contrary households in the lowest category resented interaction with better off farmers and were regarded as never seeing the importance of paying visits to other farmers in order to learn from them.

The importance of extension advice was highlighted by participants, although the perceived indifference of farmers in the 'worst' category to agricultural seminars and extension advice is an issue of concern. Access to good quality education was highly correlated with the level of financial capital a household had. It was not possible at this stage of the research to come up with an overall picture of health indicators. This is to be done during the next stage of this research. However, the affordability of balanced diets at this stage was a good proxy which clearly indicated that the majority of households never had enough to eat.

5.5 Financial capital

Within the DFID Sustainable Livelihood context, *financial capital* is defined as the financial resources that people use to achieve their livelihood objectives (Carney, 1998). It is a stock of money or other savings in liquid form e.g. financial assets such as pension rights, easily disposed assets like livestock, jewellery etc. As already indicated in the preceding discussion, financial capital is important because it can be converted into other types of capital (especially physical and some natural). Below are the findings about the financial capital of the communities that participated in the research:

- All households in the highest category were credit worthy[13] for all the sites, however, most of them preferred not to borrow from financial institutions. Households in the lowest category were not credit worthy and never borrowed from financial institutions.
- Households in the highest category had other investments which supplemented their income while those in the lowest category were limited to providing casual labour as an additional source of income.
- All households in the lowest category for all the sites never operated bank accounts. The majority of households in the highest category had bank accounts except for livestock keeping sites of Bbaale and Bubare sub-counties. Livestock keepers tend to prefer keeping money in form of animals rather than in cash in banks.

[13] The majority had land titles that could be used as collateral security to obtain loans from financial institutions.

Financial capital is the one asset that tends to be least available to the poor. In practice, it is the lack of financial capital that makes the other assets so valuable to the poor. Access to financial services and instruments available to households in the study area were skewed towards the advantaged well off. The fact that households with collateral security were not readily borrowing from financial institution raises the question of whether land reforms with the intention of availing individuals with land titles to act as security are likely to increase borrowing. Most households even those with access to financial institutions, preferred to save in real physical assets rather than with banks.

5.6 Social capital

Social capital comprises social resources upon which people draw in pursuit of their livelihood objectives. These social resources are developed through interactions that increase people's ability to work together, membership of more formal groups in which relationships are governed by accepted rules and norms, and relationships of trust that facilitate cooperation, and reduce transaction costs. Social capital registered the highest number of characteristics for all the sites except Bubare. The general trend was that the highest category was identified with the well to do members of the community. Below is the summary of characteristics of social capital:

- Ntenjeru, Bbaale, Nyakayojo and Nyamarebe sub-counties had three categories identified with similar characteristics across the sites. Households in the highest category were the type that were elected to positions of responsibility, were usually busy with private work, always financially contributed to community needs, had access to extension workers and related/interacted with people of own class/status.
- The households in the lowest category were characterized as having 'inferiority complexes', never being elected to positions of responsibility in the community, always being available to provide services in case of community needs and attended meetings to endorse what others decided.
- Nazigo sub-county had four categories clearly defining the social strata of the community.
- Bubare sub-county had two categories, the highest being identified with the well-off members of the community and lowest being identified with the rest of the community.
- The general picture for all the sites except Bubare was that those members of the community grouped in the lowest category were identified as the deviant members of the society who had mostly negative attributes. Those grouped in the highest category were the well to do who never socialized but held positions of responsibility in the respective communities. It was those grouped in the middle category that were taken to be socially good and fully accepted members of their respective communities.

It is expedient to exercise care when assessing social capital because of its negative and positive aspects/attributes. Existence of a variety of groups within a community does not necessarily mean that all the community benefits. This is because there are those excluded from strong groups that may be offering multiple benefits. It is therefore important to identify which groups are excluded from social benefits. For all the sites, most social organizations were voluntary except community leadership that excluded the very poor. Management of common resources like rangelands and physical capital like milk collections centres drew a lot from relationships and trust that facilitated cooperation.

5.7 Conclusion

The assets status framework indicated that, most farmers had more access to and utilized natural capital than any other capital. In practice no single asset is sufficient to achieve a sustainable livelihood but a range of different assets are preferred to produce sustainable livelihood outcomes. There is an emerging consensus that a holistic approach is the best to eradicate poverty and better people's livelihoods (Carney, 1998; the PEAP; and the PMA). There exists two possible relationship between assets, i.e. sequencing and substitution, that can be followed to improve the poor's livelihood outcomes given deficient endowment of some of the capitals Sequencing refers to identifying a particular set of assets to start off with as means of improving peoples' livelihood outcomes, while substitution is substituting one capital for another. It is beyond the scope of this paper to discuss and recommend whether it is sequencing or substituting of assets that can be adopted to improve peoples' livelihoods.

6 STAKEHOLDER VISITS

The stakeholder visits were undertaken to enrich the research team's understanding of the farming system and to verify information (particularly the characteristics of the asset status framework) obtained during the two-days of the workshop. The brief narrative record (each enumerator recorded what the respondent mentioned) of information about the primary and secondary stakeholders visited was the basis for classifying the stakeholders with respect to their importance to the system and power or influence over the capitals. The advantage is that an independent researcher can go through the process of classifying stakeholders without necessarily visiting them but entirely depending on this information (recorded) and the asset status framework developed for that sub-county. Finally, the physical presence of the research team on the farms and secondary stakeholder premises gave the research team a quick understanding of what the latter were involved in and the scale of operation in the farming system. However, given that the time spent on the farm by the research team was short, their judgement based on discussion with the stakeholder and limited farm visits introduces subjectivity in evaluation. For better results, the research team may wish to spend more time on the individual farm to get more accurate and detailed information. In the second phase of the research, farm household questionnaires, the design of which has been influenced by this first phase of work, will be administered in each of the study sites to get more detailed information. There were two outputs from the stakeholder visits namely, the asset polygons and classification matrix of stakeholder.

6.1 Asset/cobweb polygons

Using a predetermined scoring system[14], each of the three enumerators scored the five capitals for each household visited. Average scores were calculated for all the capitals of the primary stakeholders visited from each site that helped to estimate the scale of operation of the farms. Sustainability cobwebs are drawn to illustrate the relative access, utilization and endowment by capital which gives a more visual appreciation. This information is conveniently presented in cobweb polygons as shown in Annex 5A-Annex 5F. The computed average capitals represent a general picture in the farming system since the visits

[14] Discussed in Section 5.

were made to three farms namely large, medium and small scale. These figures show that most farmers had more access to, utilization and endowment of natural capital. Except for Nazigo and Ntenjeru sites where financial capital was scored higher than human capital, human and financial capitals for the rest of the sites was the same. Apparently, social capital was scored the lowest for all the sites except Nazigo site. These assets polygons can enable comparisons between farms, household systems, same systems over time or a relative comparison of different systems to be made.

6.2 Stakeholder classification

Stakeholder classification was done to show their power or influence over different types of capital and their importance to the functioning of the systems. Power or influence over capitals of the primary stakeholders was derived from a comparison between the structured interview notes taken during the visits and the asset status framework developed during the workshop. For secondary stakeholders, their importance was derived from the venn diagram ranking and power over capitals summarized from the semi-structured interview. The stakeholders were then ranked in descending order as vital, important, optional or marginal to the system. Their influence over the capitals was ranked in descending order as high, moderate, low/marginal, variable or unknown. An example of a matrix table of power or influence over capitals and importance to the functioning of the system for Nazigo sub-county is presented in Annex 6. Below are the salient features of stakeholder classification exercise.

- Secondary stakeholders ranked vital and important to the system are indispensable. Their withdrawal from the system could easily lead to the collapse of brittle systems or test the recovery capacity of highly resilient systems. In the farming systems surveyed, these were mainly monopolistic buyers of outputs and inputs suppliers. They played a major role in determining the equity, sustainability and productivity dimensions of the systems. In Ntenjeru sub-county, for example, Vanilla buyers were vital, especially Uganda Vanilla Limited because it had a market share of 80%. In Mbarara, milk buyers were so vital that their withdrawal from the system could lead to untold adverse effects on milk producers (dairy farmers).
- Secondary stakeholders ranked optional or marginal could easily be withdrawn without adversely affecting the system.
- Primary stakeholders considered vital were those producing significant amounts of output whose withdrawal in good numbers would drastically reduce the amount produced by the system.
- Secondary stakeholders particularly wielded high power of influence over financial and physical capitals, and moderate, marginal and variable power over human, social and natural capitals. Extension workers (advisory service providers) had high influence over social, human and natural capitals.
- Primary stakeholders varied in their power of influence over the capitals. The trend was that those with high power over financial capital had more chances of having high power of influence over physical and natural capitals.

Conclusion

This paper has detailed the work done in the Phase I of the joint research between EPRC and the Universities of Manchester and Bradford. Besides Uganda, similar work was done in South Africa. Results from both countries based on similar methodology, will be presented for comparison of the different farming systems. Phase II of the research will involve administering farm household questionnaires, complimentary participatory research activities and soil sampling. Results from that phase will be presented in a different working paper. For policy purposes, the findings from both the qualitative component (Phase I) and the quantitative component (Phase II) will help in identifying indicators for monitoring the outcomes of PMA and PEAP implementation in Uganda.

ANNEXES

ANNEX 1: RANKED INDICATORS OF SUCCESS/FAILURE AND SUSTAINABILITY BY SITE

Annex 1A: Nyakayojo sub-county Mbarara District

Table 1: Indicators of a successful banana farm.

Indicator/ Rank	1	%	2	%	3	%	4	%
Size of the banana bunch	**12**	**56**	8	24	7	20	3	9
Appearance of the banana plants(size of the stem, colour of leaves and stem)	3	14	5	15	3	9	**10**	**30**
Presence of soil and water conservation mechanisms	-	0	2	6	**8**	**23**	1	3
Spacing of the crops	2	10	**12**	**36**	6	18	5	15
Clean banana plantation (good agronomic practices)	2	10	5	15	4	12	7	22
Regular harvesting of bananas	-	0	-	0	2	6	6	18
Planting of selected varieties	2	10	1	4	4	12	1	3
Total responses/percentage	**21**	**100**	**33**	**100**	**34**	**100**	**33**	**100**

Table 2. Indicators of a failing banana farm

Indicator/ Rank	1	%	2	%	3	%	4	%
Presence of weeds (poor agronomic practices)	**30**	**94**	2	6	-	0	-	0
Small banana bunch size	2	6	**13**	**42**	6	20	3	10
Close spacing	-	0	7	23	**9**	**31**	3	10
Soil erosion	-	0	-	0	4	13	1	3
Poor looking crops with yellow colour	-	0	2	6	4	13	7	24
Plants tipping over	-	0	1	3	1	3	-	0
A lot of unuprooted stems and Non-desuckering	-	0	3	10	3	10	**8**	**29**
Inter-cropping beyond recommended	-	0	3	10	3	10	7	24
Total responses/percentage	32	100	31	100	30	100	29	100

Table 3: Indicators of sustainability of a banana farm.

Indicator/ Rank	1	%	2	%	3	%	4	%
Continuous good banana husbandry	12	26	**17**	**40**	**18**	**38**	2	5
Good fertile soils	**25**	**54**	8	19	8	17	1	2
Good weather	5	11	15	34	12	25	5	12
Availability of market	-	0	-	0	5	10	10	23
Main source of income	3	7	2	5	2	4	**20**	**46**
Extension advice	1	2	1	2	3	6	5	12
Total responses/percentage	**46**	**100**	**43**	**100**	**48**	**100**	**43**	**100**

Annex 1B: Bubare sub-county in Mbarara District

Table 4. Indicators of a successful dairy/beef farm

Indicator/ Rank	1	%	2	%	3	%	4	%
Good farm which has[15]	**12**	**74**	4	24	-	0	1	6
Good health looking animals[16]	2	13	**12**	**70**	2	11	1	6
Milking place: clean milking containers and environment	-	0	-	0	**9**	**50**	5	29
Record keeping [17]	-	0	1	6	2	11	**6**	**35**
Means of transport of the milk to collection centres	-	0	-	0	1	6	3	18
Sufficient and well paid labour	2	13	-	0	4	22	1	6
Total responses/percentages	**14**	**100**	**17**	**100**	**18**	**100**	**17**	**100**

Table 5. Indicators of a failing dairy/beef farm

Indicator/ Rank	1	%	2	%	3	%	4	%	5	%
Poor condition farm[18]	**11**	**61**	4	23	2	11	1	6	-	0
Condition of animals[19]	2	11	**10**	**59**	4	24	-	0	1	5
Milking place:	3	17	-	0	**6**	**35**	5	32	4	20
Owner not knowledgeable and does not seek advice	-	0	2	12	2	12	**9**	56	8	40
Has no/insufficient disorganised labour	2	11	1	6	3	18	1	6	**7**	**55**
Total responses/percentages	**18**	**100**	**17**	**100**	**17**	**100**	**16**	**100**	**20**	**100**

Table 6. Indicators of sustainability of a dairy/beef farm

Indicator/ Rank	1	%	2	%	3	%	4	%	5	%
Livestock keeping as the major source of livelihood	**6**	**30**	4	20	3	15	2	11	0	0
Getting technical advice[20]	4	21	**6**	**30**	3	15	3	16	2	12
Continuous good animal husbandry	2	11	2	10	3	15	**4**	**20**	2	12
Availability of good pasture and water	2	11	2	10	**6**	**30**	**4**	**20**	1	6
Acquired experience over time	2	11	2	10	3	15	2	11	**4**	**24**
Striving to maintain one's status and prestige in the community	0	0	2	10	0	0	2	11	**4**	**24**
HH members interest in the enterprise and not only the household head	1	5	2	10	2	10	2	11	3	18
Supplementary income to maintain the household during adverse periods	2	11	0	0	0	0	0	0	1	6
Total responses/percentages	19	100	20	100	20	100	19	100	17	100

[15] Paddocks, water provision, trees for shade, cattle crush and enough pastures.
[16] Animals are dewormed, good calves, good breeding bulls and high milk yielding cows.
[17] Records of animal multiplication, costs of inputs and revenue from outputs, treatment and vaccination of animals.
[18] Not fenced, no paddocks, no watering troughs, no salt lick troughs, pastures have a lot of weeds, overgrazed and no trees for shade in the farm.
[19] Poor looking animals, presence of ticks, rough skin, a sign of worms, poor unhealthy looking calves with scars, little milk yield, high mortality rate among the cows generally and calves specifically.
[20] Getting technical advice from extension agents, fellow farmers and workshops

Annex 1C: Nyamarebe sub-county Mbarara District

Table 7. Indicators of a successful maize/beans farm

Indicator/ Rank	1	%	2	%	3	%	4	%	5	%
Clean, well maintained garden	**15**	**56**	1	4	4	16	1	4	1	4
Spacing (lines)	2	7	**9**	**36**	5	20	3	13	-	0
Post harvest storage facilities	-	0	5	20	2	8	**8**	**33**	4	17
Presence of soil and water conservation mechanisms	3	11	1	4	-	0	4	17	**6**	**25**
Timing of farming activities	3	11	1	4	4	16	3	13	5	21
Planting improved seeds	4	15	7	28	**6**	**24**	1	4	3	13
Perimeter trenches to prevent	-	0	-	0	-	0	2	8	2	8
Having selected good trees in coffee plantation	-	0	1	4	4	16	2	8	3	13
Total responses/percentages	27	100	25	100	25	100	24	100	24	100

Table 8. Indicators of a failing maize/beans farm

Indicator/ Rank	1	%	2	%	3	%	4	%	5	%
Unweeded, poorly maintained garden	**12**	**50**	6	24	1	5	2	11	3	14
Late timing of farming activities	3	13	4	16	3	14	3	16	5	23
Lack of soil and water conservation mechanisms	8	33	**7**	**28**	6	27	1	5	-	0
Lack of perimeter trenches	-	0	1	4	3	14	1	5	1	5
Poor agronomic practices	1	4	5	20	**6**	**27**	3	16	1	5
Lack of storage facilities (stores)	-	0	-	0	3	14	**7**	**37**	4	18
Lack of interest in farming	-	0	2	8	-	0	2	11	**8**	**36**
Total responses/percentages	**24**	**100**	**25**	**100**	**22**	**100**	**19**	**100**	**22**	**100**

Table 9. Indicators of sustainability of a maize/beans farm

Indicator/ Rank	1	%	2	%	3	%	4	%	5	%
Availability of capital for investment	1	3	2	7	4	14	-	0	1	3
Utilization of extension advice and knowledge	5	17	1	3	2	7	3	10	3	10
Soil fertility	**14**	**48**	9	31	3	10	-	0	3	10
Sufficient amount of land	4	14	**8**	**28**	1	3	-	0	3	10
Household interest in the farm enterprise	-	0	3	10	1	3	2	7	2	7
Utilization of indigenous/ traditional knowledge	4	14	2	7	**7**	**24**	5	17	1	3
Foresightedness	-	0	-	0	5	17	7	24	2	7
Availability of market for produce	-	0	3	10	3	10	**8**	**28**	8	27
Presence of good roads	1	3	1	3	3	10	4	14	7	23
Total responses/percentages	**29**	**100**	**19**	**100**	**29**	**100**	**29**	**100**	**30**	**100**

ANNEX 2: ASSET STATUS FRAMEWORK

Livestock-Cassava/Millet Farming System in Bbaale sub-county (Mukono District)

Low	**(access, utilization, endowment)**	**High**
Natural		
Score 17 • Practices poor spacing in his garden • Does not have enough land-about 1 acre • Does not practice crop rotation • Doesn't mulch or cover the land • Water is far from farm for cows • No trees for a shade and burns grass • The soil is not fertile, it is stony, rocky, clay type, salty and red • Poor farming methods e.g. no pruning of coffee • Does not practice soil conservation • Does not treat his cattle when they are sick • Has poor quality seeds • Eats seeds meant for planting	**Score 50** ▪ Has about 5 acres of land ▪ Practices good farming methods	**Score 83** • Practices land fallowing • Has adequate land, 10 and more acres • Has trees on his land • Water source is close to farm • Has fertile soil • Practices soil conservation • Farm is on flat and gently slopping land • Mulches land and recycles vegetation and litter • Has constructed a kraal for his cattle • Prevents wind erosion
Proportion of farmers 60%	*30%*	*10%*

Physical		
Score 17 • Only the husband has a good hoe • The wife and children have poor quality worn out hoes • Has no access to market • Has no animal kraal • Has no means of transport • Dresses poorly • Has a grass thatched mud house • Garden is not fenced • Has no or poorly constructed toilet	*Score 50*	*Score 83* • Has two spray pumps (one for animals and the other for crops) • Has means of transport e.g. vehicle, motorbike, bicycle • Has an ox-plough • Has more than 10 hoes • Keeps and plants good quality seeds • Has an iron roofed brick house • The garden is fenced • Has a food store/granary • Has a toilet that is in a good condition
Proportion of farmers 60%	***35%***	***5%***

Financial

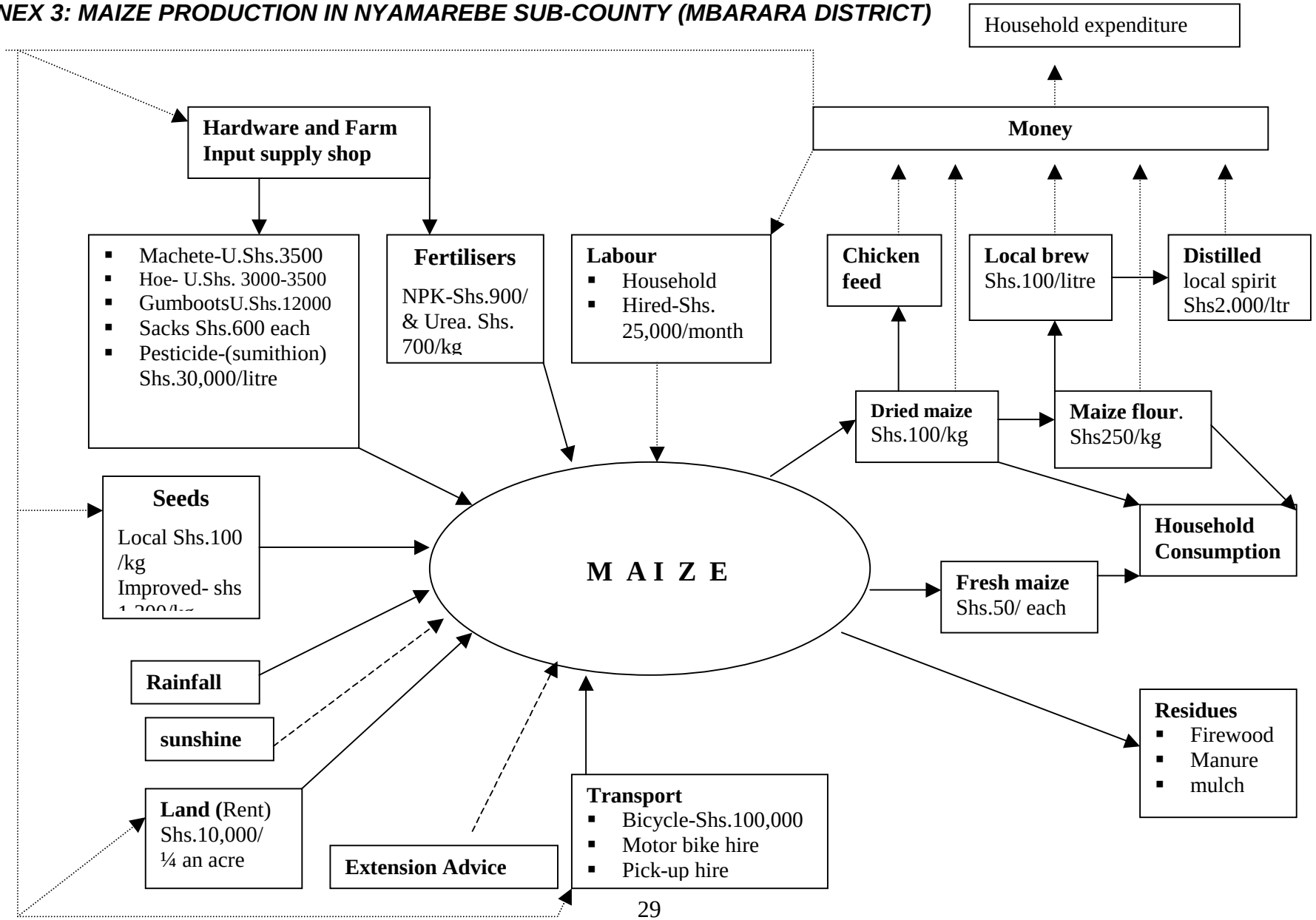
Score 17 ▪ Has no money ▪ Has no farm proceeds to sell ▪ Has no financial discipline ▪ Borrows money to buy cigarettes and alcohol ▪ Always defaults when he borrows ▪ Is not credit worthy ▪ Sells most of the food grown ▪ Has no access to bank credit facilities ▪ Has ¼-1 ½ acres of land ▪ Mainly grows millet and sorghum ▪ Has about 7 local breed chickens ▪ Has no bank account ▪ Has no access to credit facilities	*50*	*Score 83* ▪ Has money ▪ Has over 200 cows ▪ Has 1-4 acres of cassava ▪ Has a 3 banana acre plantation ▪ Has 1-3 acres of millet ▪ Does not borrow ▪ Operates no bank account-there is no bank in the area ▪ Has other investments that form other sources of income like houses, taxis, shops, motor-bike, pick-up ▪ Most of them are full time farmers.
Proportion of farmers 80%	*15%*	*5%*

Social

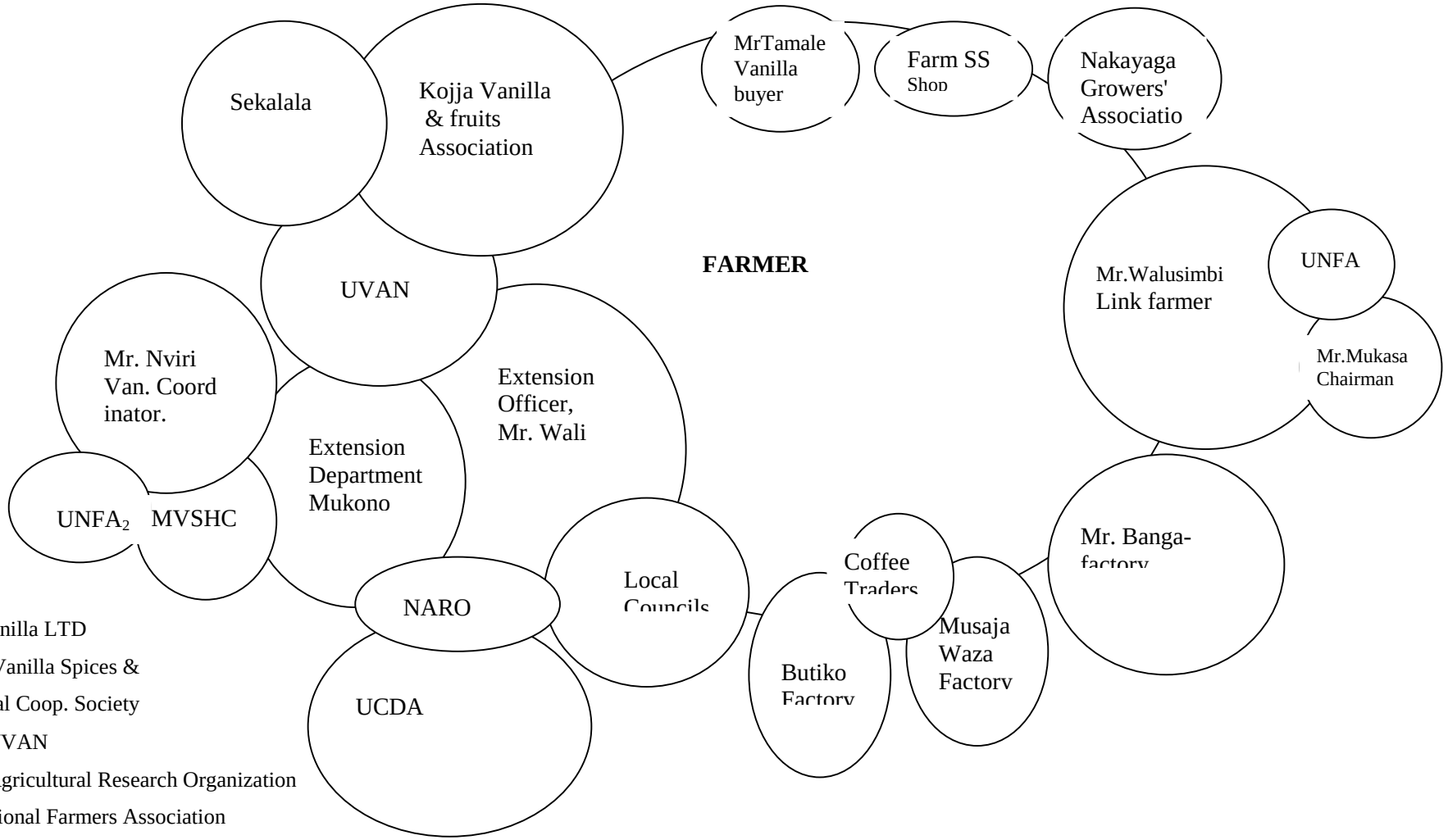
Score17 ▪ Not given chance to volunteer suggestions in meetings ▪ Disturb meeting proceedings because they are always drunk ▪ Has poor working relationships with other workers ▪ Does not go for seminars or workshops ▪ His wife is always on the move ▪ Attends local council meetings ▪ Has an inferiority complex ▪ Minimized and despised by the well-off ▪ Elected to serve in the local defense force ▪ Not elected to positions of local leadership ▪ Is a tax defaulter ▪ Does not make friends easily	*Score 50* ▪ Comes to meetings and attends seminars/workshops ▪ Entertains and attends to community visitors ▪ Resides in the local community ▪ Pays taxes ▪ Deliberates on village issues ▪ Bridges all categories of village people and does not discriminate among people	*Score 83* ▪ His cattle eat the poor peoples' food which causes conflicts ▪ Elected to positions of community responsibilities ▪ Despises the worse off people ▪ Some are not well behaved in society ▪ Some are tax defaulters ▪ Has good working relationships with extension workers ▪ Rarely attends meetings because he is busy ▪ Extension officers meet them in their homes ▪ They have homes in trading centers, urban centers and towns ▪ Not always a resident in the village
Proportion of farmers 30%	***60%***	***10%***

Human		
Score 17 ▪ Does not consult wealthy people for advice ▪ Does not hire, but is hired by others to work ▪ Does not like or implement extension knowledge and does not go for seminars/ training. ▪ Is lazy, careless and slow and has no faith in what he is doing ▪ Not consistent, but jumps/rotates from one activity to another which reduces concentration e.g. cultivation, livestock and charcoal selling ▪ Is involved in gambling ▪ Has a starving and poorly fed household ▪ Is a drunkard and never happy ▪ Has a large household; 2-3 wives, many children. ▪ Occasionally, he is a bachelor ▪ Children do not go to school, or they go to low standard schools ▪ Many have Advanced Level education ▪ The family does not feed well	*Score 50*	*Score 83* ▪ Has 2-5 permanent hired workers and 3 on temporal basis ▪ Some attained primary seven education, while others never got any school education ▪ Has a large family of about 20 people ▪ Has 2-3 wives ▪ Has many dependents ▪ Children are in good boarding schools ▪ Sometimes does not pay workers
Proportion of farmers 65%	*25%*	*10%*

ANNEX 3: MAIZE PRODUCTION IN NYAMAREBE SUB-COUNTY (MBARARA DISTRICT)



ANNEX 4: NTENJERU SUB-COUNTY



Key

UVAN =Uganda Vanilla LTD

MVSHCS= Mukono Vanilla Spices & Horticultural Coop. Society

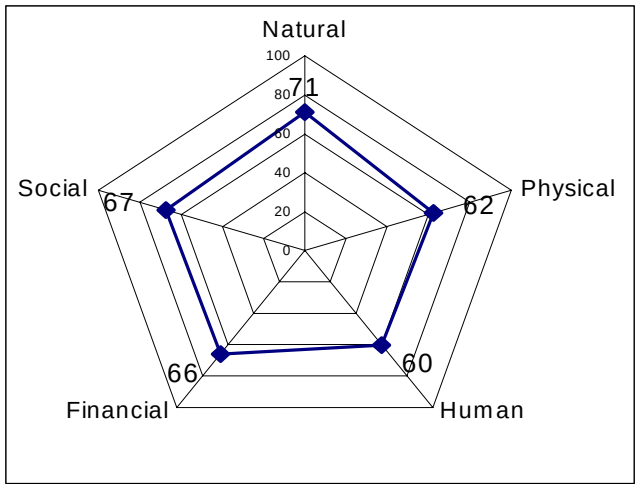
Sekalala = Director UVAN

NARO = National Agricultural Research Organization

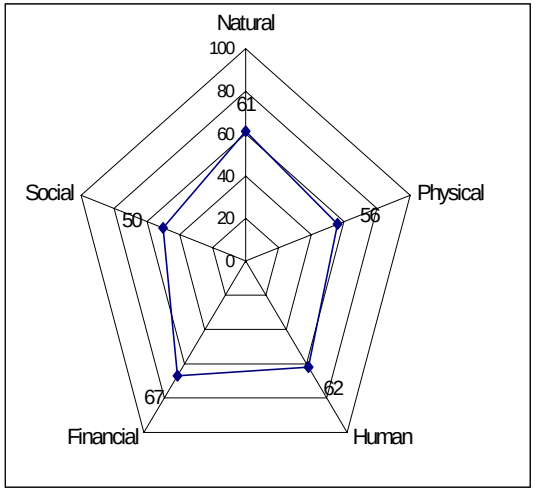
UNFA = Uganda national Farmers Association

ANNEX 5: AVERAGE CAPITAL FOR THE THREE VISITED FARMS AT EACH SITE

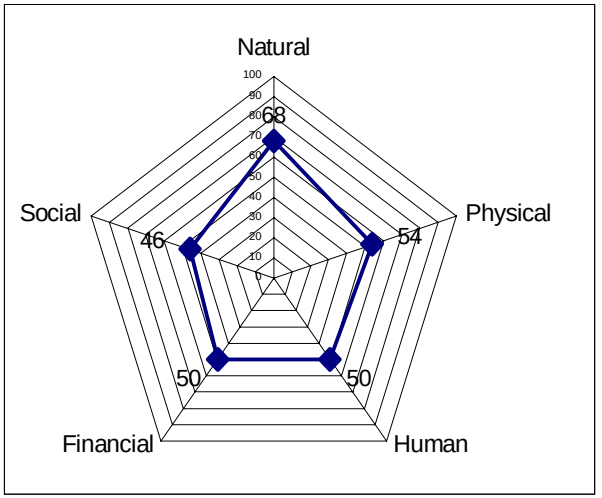
Annex 5.A: Nazigo Sub-county



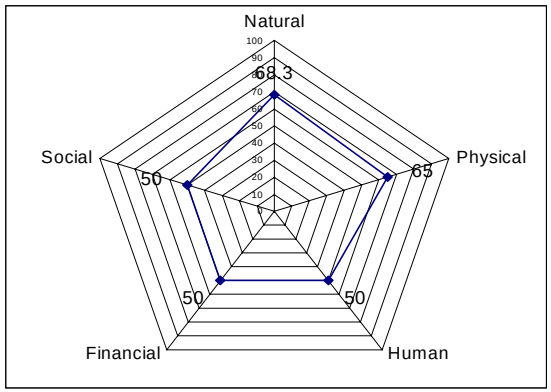
Annex 5.B: Ntenjeru Sub-county



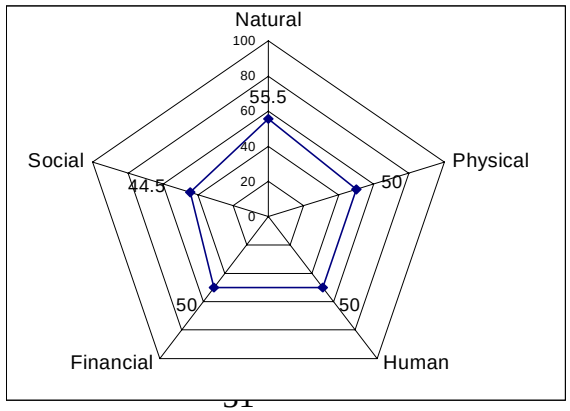
Annex 5C: Bbaale Sub-county



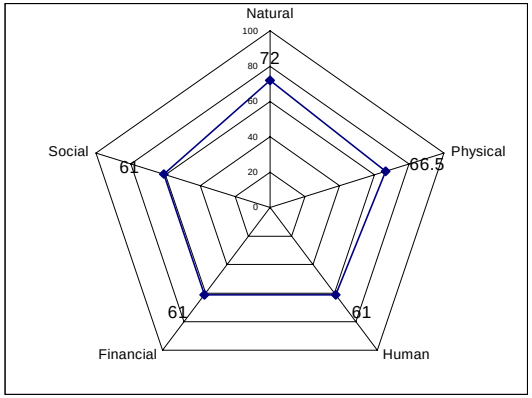
Annex 5.D: Nyakayojo Sub-county



Annex 5.E: Bubare Sub-county



Annex 5.F: Nyamarebe Sub-county



ANNEX 6: STAKEHOLDER CLASSIFICATION – NAZIGO SUB-COUNTY

Stakeholder Class	Stakeholder Name	Institutional Sector	Function/ Interest	Importance to System	Power Over Capitals
Primary	Farmer 3, small scale	Peasant Agriculture Private (Household)	Crop production (coffee, banana, passion fruit and other food crops)	• Important to productivity • Marginal importance in equity • Vital to sustainability	• Variable power over natural, human and social capital • Marginal over physical and financial capital
Primary	Farmer 1, medium scale	Peasant Agriculture Private (Household)	Crop production (coffee, banana intercropping as well as banana monoculture) Livestock production	• Important to productivity • Optional to equity • Vital to sustainability	• High power over natural capital • Moderate power over physical, social and human capital • Moderate power over financial capital
Primary	Farmer 2, large scale	Agriculture Private (Household)	Crop production (coffee, banana food crops) Fish farming; Livestock production	• Vital to productivity • Vital to equity • Vital to sustainability	• High power over natural, physical, human capital • Moderate power over social and financial capital
Secondary	Kotwe Coffee factory	Coffee Processor Membership Organization	Provides coffee processing services, provides credit, information, transport, coffee husks to members	• Optional to productivity • Optional to equity • Optional to sustainability	• Moderate power over social, financial, physical, human capital • Unknown power over natural capital
Secondary	Mr. Mpagi	Extension Officer – Nazigo S-C Public (Local Government)	Provides extension advice to farmers for both livestock and crops namely coffee, bananas, pineapples and seasonal crops like tomatoes, cabbages and passion fruits; distributes animal vaccines	• Important to productivity • Important to equity • Important to sustainability	• High power over human, social capital • Moderate power over physical, financial capital • Unknown power over natural capital
Secondary	Mr Mwanja	Farm Supply Shop Private (Enterprise)	Sells inputs to farmers especially chemicals, seeds, fertilizer, spray pumps, vet drugs, gives advice and credit facilities	• Important to productivity • Important to equity • Important to sustainability	• High power over physical, human capital • Moderate power over financial and social capital • Unknown power over natural capital
Secondary	Mr K Nyanzi	Coffee Buyer Private (Enterprise)	Buys coffee from farmers, may offer transport services to some farmers	• Optional to productivity • Optional to equity • Optional to sustainability	• Marginal power over all the capitals

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