MSc Agricultural Development

Voucher Systems for Food Security

A Case Study on Kenya's Sarafu-Credit

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ABSTRACT

Communities in both Kenyan informal settlements and in arid and semi-arid lands (ASAL) are food insecure, especially due to low production levels, fluctuations in food prices and lack of access to financial services. This study examines how a financial innovation called the Sarafu-Credit voucher system (VS) impacts food security, exchange, affordability and allocation. VSs have been implemented by the Kenyan non-governmental organization Grassroots Economics (GE) since 2011. This voucher system is a complementary mean of exchange to the national currency which is backed by local assets and issued at no charge. This research therefore aims to fulfill this knowledge gap by examining two Kenyan case studies, one in an informal urban settlement in Nairobi and one in a semi-arid rural area in Kwale County. Preliminary findings suggest that treatment groups (communities using Sarafu-Credit vouchers) are consuming roughly 78% more food daily than control groups (not using Sarafu-Credit vouchers) in both Urban (77.9%) and Rural (78.2%) case studies. These results show that the VSs have a strong potential to be used as an instrument to address food security issues among vulnerable communities. Based on these assumptions, it is argued that the VSs could be used as policy instruments to foster food security among vulnerable communities and correct market failures.

Keywords: voucher systems, sarafu-credit, food security, food affordability, food allocation, exchange, food system, Kenya.

INTRODUCTION

FOOD SECURITY ISSUES AND INFORMAL SETTLEMENTS IN KENYA

Despite the fact that Kenya is a "leading commercial and logistics hub in the region" and is the largest East-African economy (Muchai and Kimuyu, 2017), nearly 50 percent of Kenya's population lives in extreme poverty (UNDP, 2017). Extreme poverty is defined by an income of $1.25 a day or less. Kenya is experiencing an upsurge in rural to urban migration as the youth population see few opportunities for advancement in the villages (UNDP, 2016).

One manifestation of this poverty is the growth of the informal sector and informal settlements in response to the failure of the formal sector to provide adequate employment opportunities and infrastructure. The few employment opportunities that are created are typically based in urban areas driving millions to compete for scarce positions. According to the World Bank (2017, p.26), "nearly 61 percent of urban [Kenyan] households live in" informal settlements while Kenya has an urbanization of 4,4 percent.

National and local governments are deeply challenged by rural to urban migration and "formal wages are also not able to sufficiently supply the income generating needs of the rural and increasing urban population, contributing to growth of the informal sector" (UN-Habitat, 2016, p.v). Despite numerous interventions, the provision of shelter and basic needs to the communities such as water, sanitation, employment, education, transport and public health cannot match with the increasing demand (Bendell et al., 2015, p.10). This under provision of basic services, and other consequences of accelerated urbanization such as land degradation, moreover pose a threat to human society, peace, and sustainable development (Hove et al., 2014).

According to Oxfam (2017), slum dwellers are subject to volatile markets and increased costs of food, which have pushed an already vulnerable people into extreme poverty, rendering them incapable of feeding their families or paying for basic services such as healthcare, rent and school fees. The price of maize which is the basic staple food for the poorest, increased by 133% over 2016 forcing the government to intervene by introducing a subsidy programme of selling a 2kg maize flour at KES 90 to cushion consumers (Ibid).

Kenyan policy makers consequently face serious pressure in finding efficient ways to deal with sustainability and food security issues in informal human settlements.

FOOD SECURITY ISSUES AND VULNERABLE RURAL AREAS IN KENYA

According to the World Food program, Kenya's most vulnerable to food insecurity live in the arid and semi-arid lands (ASAL) outside urban informal settlements. According to the IFAD (2015), arid and semi-arid lands make up more than 80 per cent of the country's land mass and are home to approximately 36 per cent of the population (12 percent in the arid areas and 24 percent in semi-arid areas). The population who lives in this region suffer from poverty, structural underdevelopment, conflict and disease.

These arid and semi-arid regions have the lowest development indicators (numerical measure that indicates the quality of life) and the highest incidence of poverty in the country (Ibid). The agricultural sector which contributes over 25 percent of the country's annual Gross Domestic Product (GDP), is particularly affected by changing climatic conditions (Ibid). Nearly 98 per cent of crop production is

rain-fed and almost 50 percent of animal production occurs in ASALs (Ibid). Therefore increased incidence of drought and unreliable rainfall significantly affects the agriculture sector (Ibid).

Food security remains a major challenge in arid and semi-arid rural areas for the Kenyan government. According to the global hunger index, Kenya remains a food-insecure country although there have been slight improvements in the hunger situation (Ibid). Some underlying causes of food insecurity are: chronic poverty; poor infrastructure; high population growth; dysfunctional markets; overdependence on rain-fed agriculture and limited investments in these regions. Climate change exacerbates this situation, accelerating land degradation and fragmentation, which when coupled with poor natural resource management means that Kenya faces a very hard fight to increase food security and smallholder income as climate change intensifies. The World Food Programme underlines that local people respond to droughts and unpredictable rain patterns by adopting harmful coping practices such as selling their only productive assets, withdrawing children from school/ and undertake environmental unfriendly strategies.

Kenyan decision-makers are consequently looking for strategies to tackle poverty and food security issues in the arid and semi-arid lands. They are especially interested on implemented financial services linked to on-farm investment to boost yields and income generation which can in turn be used for re-investment in farms.

KENYAN SARAFU-CREDIT VOUCHER SYSTEMS

The Non-Governmental Organization Grassroots Economics (GE) has implemented the Sarafu-Credit voucher system (also known as Community Currency (CCs)) in Kenya to supplement the lack of national currency and achieve sustainable development goals among vulnerable communities. The Sarafu vouchers are backed by local assets and are issued via zero-interest loans to the local people for a one year period. By complementing the national currency, the Sarafu-Credit voucher system allows trade relations even when the national currency is scarce. Intuitively, it is therefore believe that this system could foster food security by providing a complementary mean of payment for purchasing food.

RESEARCH OBJECTIVES

This paper aims to assess the (potential) outcomes of Sarafu-Credit voucher systems (VSs) on food security in vulnerable rural and urbans areas based on empirical evidence from the Kenyan experiences. The complex food system approach introduced by Ericksen (2008) constitutes the broader framework on which this research study operates and the food security issue is addressed. The focus is access to food, especially affordability and allocation, and food availability, particularly food exchange mechanisms.

This research therefore attempts to explore the outcomes of vouchers on food availability, allocation and exchange in informal settlements and arid and semi-arid rural areas.

What outcomes do Kenyan Sarafu-Credit voucher systems foster in terms of food affordability, allocation and exchange?

After reviewing the Kenyan voucher schemes and the literature associated as well as the methodology of the fieldwork done in Miyani and in Nairobi, some preliminary results are presented and discussed.

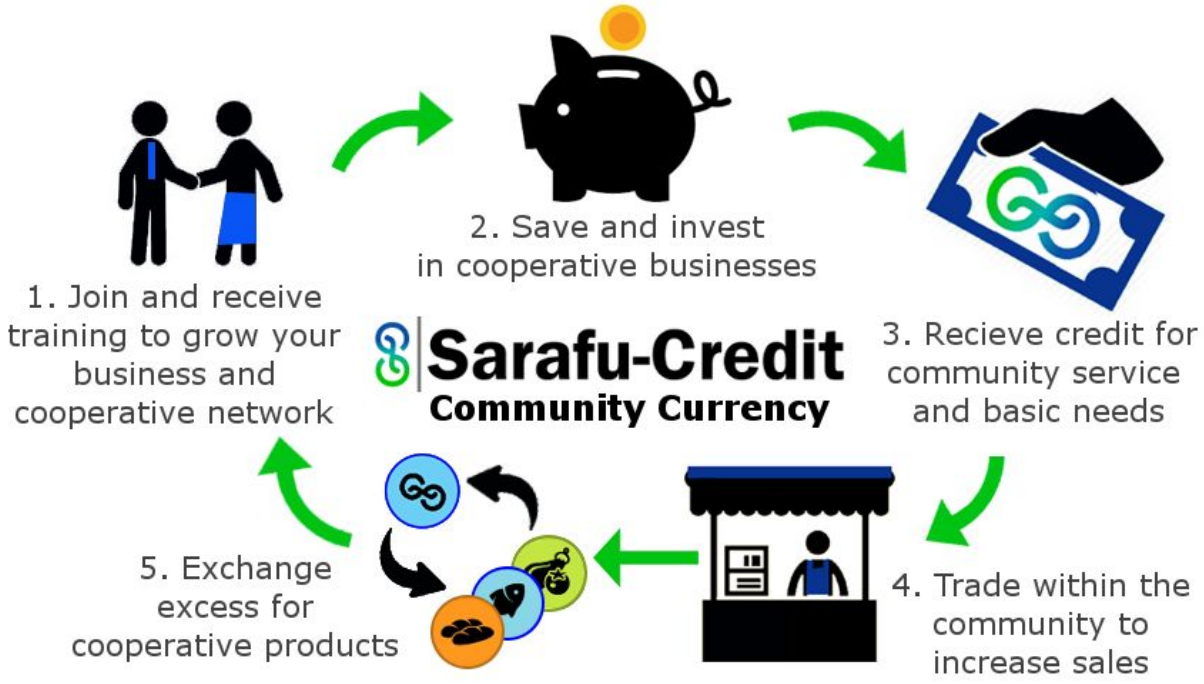
BACKGROUND ON KENYAN SARAFU-CREDIT VOUCHER SYSTEMS

THE SARAFU CREDIT AS A POTENTIAL POLICY INSTRUMENT TO ACHIEVE SUSTAINABLE DEVELOPMENT

Since 2010, Grassroots Economics (GE) has developed voucher programs in Kenyan informal settlements, aiming at building local resilient economies and empowered communities. These vouchers are regional means of exchange that complement and supplement the national currency system. GE provides low-income communities with a complementary mean of exchange which allows trades of goods and services to take place without scarce national currency (Ruddick and Mariani, 2015). Moreover, the use of the vouchers for trading between local businesses allows the users to save their Kenyan Shillings for reinvestments in their businesses or for paying education and health services (Ibid). In short, the vouchers launched by GE create a buffering countercyclical system of trade in rural and informal settlements by complementing the lack of national currency and matching unused resources with unmet demand (Ruddick and Dissaux, 2017). In these communities, the Sarafu-Credit is used as a spending currency while the national currency is used as a savings and investment currency (Sillen, 2017).

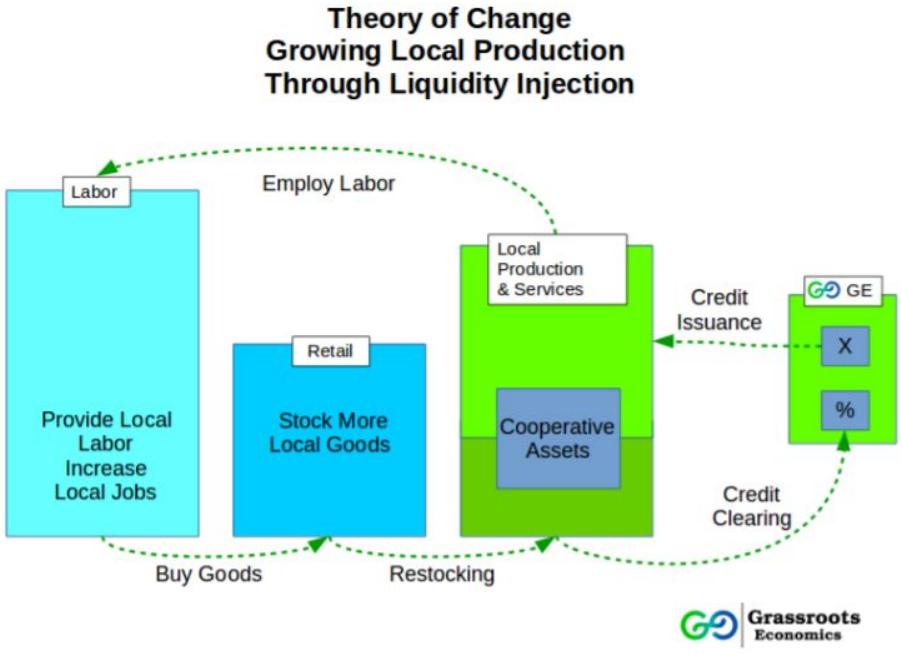
Furthermore, GE helps marginalized communities in developing cooperative businesses and other local assets, which replace imports. Sarafu-Credit is therefore a commodity-backed voucher: the vouchers issued via zero-interest loans are backed by the assets of the cooperative businesses. The Sarafu-Credit vouchers can be used to trade goods and services among local businesses as well as to purchase cooperative assets (including profits in Kenya shillings). Via zero-interest loans, the Sarafu-Credit can be issued among the community directly to pay for social and environmental services based on both donor backing and profits from cooperative assets (Ruddick and Dissaux, 2017). This mechanism allows non-members to also receive the Sarafu-Credit by contributing to community services (Ruddick, Richards, & Bendell, 2015).

Figure 1: The Sarafu-Credit voucher system (source: grassroots economics)



Dissaux and Ruddick (2017) refer to the theory of change to argue about the potential of sarafu credit as a policy instrument to achieve sustainable development. The theory of change is that by providing access to an interest free credit, local businesses can expand their activities and employ some of the currently wasted or exported labour sector, who can in turn purchase more goods from local retailers, who in turn can purchase stock from local suppliers. By injecting liquidity in the form of a zero-interest credit, the local production and service industry is not burdened by debt and is able to expand. The more cooperative assets exist the larger the amount of vouchers can be injected into the community, which increases local trade and helps local assets grow.

Figure 2: The theory of change and the sarafu-credit (source: Dissaux and Ruddick, 2017)



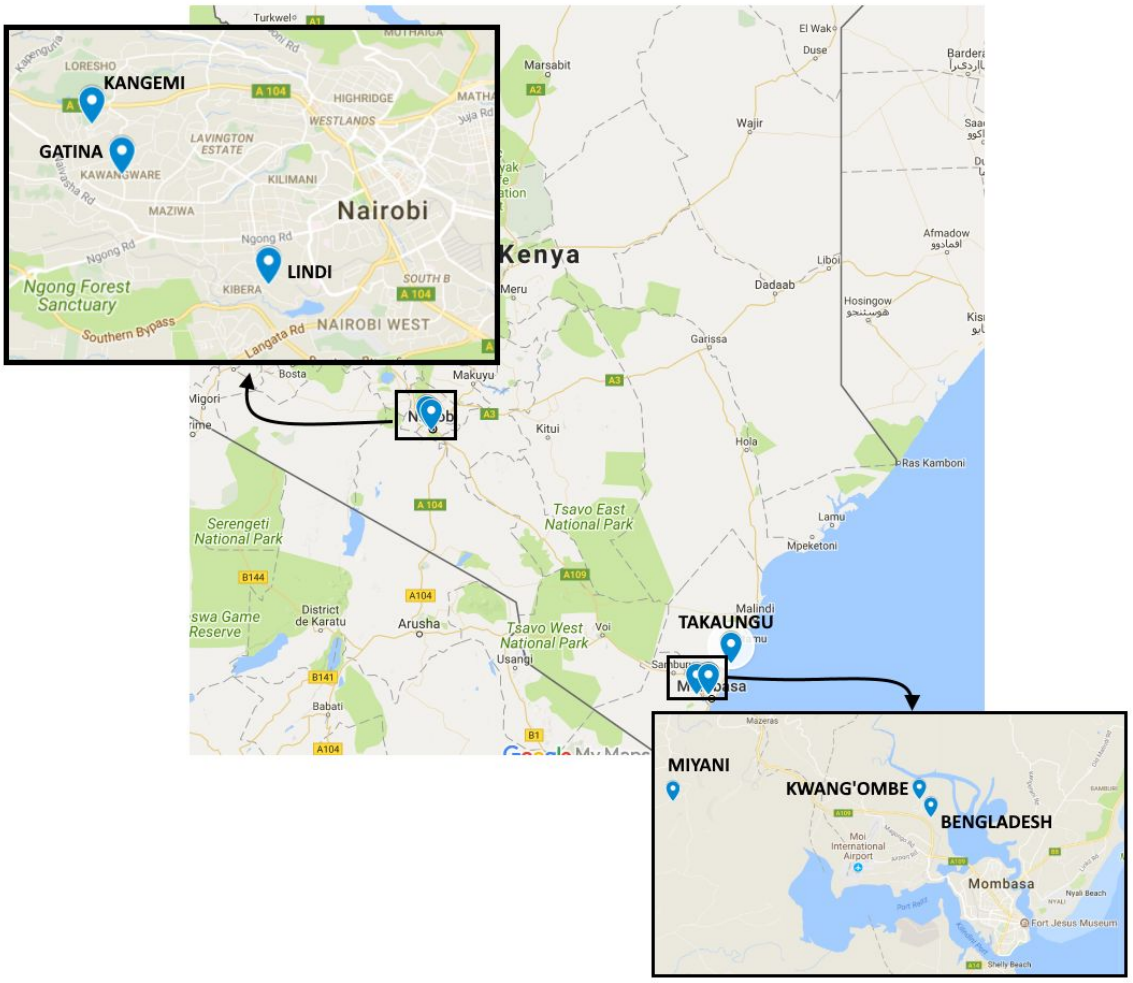
OVERVIEW OF THE KENYAN SARAFU-CREDIT VOUCHER SYSTEMS

Currently, six Sarafu-Credit Voucher Systems are circulating in Kenya, launched by GE: two in Mombasa, three in Nairobi and one in Kwale County.

Table 1: Kenyan Sarafu-Credit voucher systems

COUNTIES	COMMUNITY CURRENCIES	LAUNCHING YEAR	DETAILS
Mombasa County	Bangla-Pesa in Birikani Mikindani	2013	Businesses: 222 Circulation: 88 800 Cooperative Backing: Retail shop
	Ng'ombeni-Pesa in Kwa-Ng'ombe Mikindani	2015	Businesses:200 Circulation: 80 000 Cooperative Backing: Tailoring shop
Nairobi County	Gatina-Pesa in Karangware	2014	Businesses: 318 Circulation: 127 200 Cooperative Backing: Wholesale shop
	Kangemi-Pesa in Kangemi	2015	Businesses: 250 Circulation: 100 000 Cooperative Backing: Schools
	Lindi-pesa in Kibera	2015	Businesses: 249 Circulation: 99 600 Cooperative Backing: Retail shop (closed)
Kwale County	Miyani-Pesa in Miyani	2017	Businesses: 40 Circulation: 16 000 Cooperative Backing: Posho Mill
Kilifi County	Takaungu-Pesa in Takaungu (currently in process of introduction)	2018	

Figure 3: Voucher systems in Kenya



KENYAN SARAFU-CREDIT VOUCHER SYSTEMS (AKA COMMUNITY CURRENCIES (CCs)): A LITERATURE REVIEW

Table 2: Literature review associated to the Kenyan Sarafu-credit voucher systems

AUTHORS	TITLE	RESEARCH OBJECTIVES	METHODOLOGY OF THE RESEARCH	CASE STUDIES
Sillan D. (2017) Maastricht University (Germany) Master thesis/ MSc Public policy and Human Development	Community currency (CCs) programs as a tool for the sustainable development of informal settlements: the cases of Mombasa and Nairobi County, Kenya.	Quantitative impact assessment on lifestyle outcomes (altruistic behavior)	Quantitative analysis based on the inverse probability of treatment weighting and the propensity score. Data issued from the surveys collected by GE in 2017 (sampling: 530 users and 863 non-users from the GE's survey (2017))	CCs in Mombasa and Nairobi Counties

Dezin, T. (2017) KU Leuven (Belgium) Master thesis/ MSc Cultural Anthropology and Development studies	Community Currencies in a Development Context: the case of the Sarafu-credit in Kenya	Impact assessment of CCs on livelihoods of the users. Analysis of the downward accountability of GE towards the communities.	Qualitative analysis (semi-structured/ informal interviews with GE employees and users, direct observation). Quantitative analysis (from the GE's survey (2017)).	CCs in Mombasa county
Anagrius, H. (2017) Stockholm University (Sweden) Master thesis/ MSc Social-ecological resilience for sustainable development	The case of Sarafu-credits: examining how a community currency can contribute to sustainable livelihoods in informal settlements	Sarafu-credits, sustainable livelihoods and socio-ecological resilience: impacts of the sarafu-credit on (1) the resilience to liquidity shortage, (2) local food production, (3) environmental management, (4) general health and education, (5) social capital.	Qualitative study (semi-structured with 30 users and GE members) Triangulation with Quantitative data (from the surveys launched by GE in 2017) as secondary data.	CCs in Mombasa county
Dissaux, T. and Ruddick, W. (2017) Working paper for the 4e international conference on social and complementary currencies	Challenges of collective organization and institution building around community currencies in Kenyan slums	Institutionalisation of the CC model and transition from the Bangla-Pesa model towards the Sarafu-credit model.		Kenyan CCs
Dissaux (2016) Université Lumière Lyon 2 (France)/ AFD (Agence Française de Développement) Master thesis/ MSc Economie et Développement	L'usage des monnaies complémentaires comme outil du développement	Assessment of the potential of CCs as a policy instrument in development	Qualitative data (semi-structured interviews with 84 users and key informants, participatory observation)	Bangla-pesa (Mombasa County)
Mbula Mule, S., (2016) University of Nairobi (Kenya) Research project for the degree of bachelor of science in Food nutrition and Dietetics	Relationship between community currencies and nutritional intake of households in Kibera, Kenya	Assess the relationship between CCs and the nutritional intake of households in Kibera (Lindi) Compare (1) the daily average intake of nutrients; (2) the consumption frequency of high-fiber starches, highly bio-available proteins, fortified foods and prestigious foods ; (3) the diatery diversity between CC users and non-users. Determine what proportion of CCs is used in the purchase of food items.	Observational comparative study based on key informant interviews, 24 hours dietary recall, dietary diversity score and food frequency questionnaire (qualitative and quantitative data)	Lindi-Pesa, Kibera (Nairobi County)

Omanga, R. (2016) Strathmore Business School (Kenya) Research project for the MSc of Executive business administration	The role of complementary currency in promoting business growth in an informal economy: case of bangla-pesa in Bangladesh slum, Mombasa County	The role of complementary currency in promoting business growth in an informal settlement.	Qualitative data (observation and interviews with 12 key informants) Quantitative data (questionnaire among 123 traders)	Bangla-pesa (Mombasa county)
Ruddick, W. (2015) Working paper for the 3d International conference on social and complementary currencies	Trust and Spending of Community Currencies in Kenya	Experiences and challenges of implementing CCs. Empirical results following the usage of CCs.	Quantitative data: baseline and following surveys	CCs in Mombasa and Nairobi counties.
Bendell, J., Richard, A. M. and Ruddick, W. (2015) Published paper in the International Journal of Community Currency Research	Complementary currencies for sustainable development in Kenya: the case of the Bangla Pesa.	Detailed description of Bangla-Pesa programme: documentation of reasons for creation, implementation, benefits and difficulties encountered.	Quantitative data (baseline surveys)	Bangla-Pesa (Mombasa county)
Bendell, J., Slater, M. and Ruddick, W. (2015) Working paper for the UNRISD Workshop "Social and Solidarity Finance: tensions, opportunities and Transformative Potential"	Re-imagining money to broaden the future of development finance. What Kenyan Community Currencies reveal is possible for financing development.	Inform policy makers about the nature of money and finance to enable development researchers and professionals to engage better with currency innovations for sustainable development	Monetary theory and empirical evidence from a case-study	Bangla-Pesa (Mombasa county)
Ruddick, W. and Mariani, L. (2013) Working paper for the international conference on potential and limits of social and solidarity economy (UNRISD, ILO, NGLS)	Complementary currencies strengthening the Social and Solidarity economy (SSE); case studies from Kenya.	Assessment of the potential of community currencies in fostering SSE in informal settlements	Comparative case studies Eco Pesa and Bangla Pesa	Bangla-Pesa (Mombasa county) Eco-Pesa
Richards, M. and Ruddick, W. (2013) Published paper for the international conference on potential and limits of social and solidarity economy (UNRISD, ILO, NGLS)	Kenyan Businesswoman transforming slum economies through complementary currencies	Assessment of the potential of CCS as a new development model to empower businesswomen and build a social and solidarity economy in slums	Case-study of the Bangla-Pesa	Bangla-Pesa (Mombasa county)
Ruddick, W. (2011) Published paper in the International	Eco-Pesa: an evaluation of a complementary currency	Description and evaluation of the Eco-Pesa programme.	Qualitative and quantitative data (case-study)	Eco-Pesa

Journal of Community Currency Research	programme in Kenya's informal settlements			

GE programs have been assessed by researchers since 2011, resulting in 3 published papers, 4 working papers and 6 master theses.

The first Sarafu-Credit Voucher System (VS) (aka Community Currency (CC)) experience, the Eco-Pesa, has resulted in positive economic, social and environmental outcomes, showing the potential of CCs in sustainable development interventions (Ruddick, 2011; Ruddick and Mariani, 2013). The Eco-Pesa was a convertible voucher backed by a donor funds in national currencies, circulating among a network of 75 small local businesses in Kongowea, Kenya. The objective of this program was to foster waste management as well as to economically empower the urban vulnerable people (especially the youth). One of the results of the introduction of this program was "that an estimated $4,176 USD worth of trading was facilitated through the circulation of only $352 USD worth of Eco-Pesa" (Ruddick, 2011, p.11). The Eco-Pesa furthermore caused a 22% average increase in the incomes of participating businesses, three youth-led community tree nurseries to be created and 20 tons of waste to be collected. Other benefits of the Eco-Pesa program were that it was cost effective (over a period of seven months only $4,698 USD was spent), it offered an enhanced system for increasing accountability and keeping track of development funding.

The second CC scheme launched by GE, the Bangla-Pesa, has been deeply examined since its creation. The gender perspective of Richards, M. and Ruddick, W. (2013) showed that sustainable poverty reduction and community benefits are possible and cost-effective through CCs. These positive impacts can be targeted at vulnerable groups, such as women, to reduce inequality in development by enabling women to care for their families without using up their business profits (Ibid). They concluded that there is an acute need for an authoritative body to offer technical assistance to governments and engage with development actors if CCs are to reach their full potential (Ibid).
These results have also been underlined by Ruddick and Mariani (2013) who provided compelling evidence that CCs fit squarely the efforts of organizations like the Transition Movement and International Labor Organization to support SSE. They also argued that CCs offer a buffer system to ease a transition off of fractional reserve and debt based national currencies.

Bendell et al. (2015) provided a more theoretical analysis of the potential CCs hold for broadening the future of development finance. They explained the nature of money and finance with the aim of achieving a better engagement of policy makers and researchers with monetary innovations for sustainable development. Bendell et al. used the case of the Bangla-Pesa to demonstrate how re-imagining money can lead to positive development outcomes. They furthermore demonstrated that the Bangla-Pesa model is very cost-efficient and therefore holds the potential to innovate development finance. Bangla-Pesa is, indeed, shown to have facilitated, upon its launch, exchanges of roughly 50 Euros in value per day among 109 businesses, which is projected to raise living standards in the community primarily through the utilization of excess business capacity. After only a week of circulation – Bangla-Pesa represented an estimated 22% total trade among community members.

The study of Omanga (2016) also revealed that community currencies can have a positive impact on poverty reduction by helping generate additional profits for businesses. Her study showed that the Bangla-Pesa allows people to barter trade more effectively, improving daily sales by increasing

interactions between local people. Besides, she found that the Bangla-Pesa helps the users in increasing their savings, and thus helps them to get financial assistance from chamas and other microfinance institutions. Finally, she underlines that the CC increases the access to social services and community empowerment.

Finally, Dissaux (2016) advocated the potential of CCs as localized monetary commons to be an effective tool for inclusive development and the development of a cooperative economy. His study of the Bangla-Pesa also suggested that a common governance structure could secure that the interests of all parties are given the same attention, which would for example imply that the poor can take part in the process of implementation and governance of the financial services that will be used by them.

Besides the Bangla-Pesa, some scholars have assessed the impacts of all the Kenyan CCs. At first, a qualitative analysis of the Bangla-Pesa, Gatina-Pesa and Kangemi-Pesa is given by Ruddick (2015). The study showed that 5%-10% of local food purchases are being done using the CCs among members and that CC usage is positively correlated to increasing levels of community trust. Besides, it revealed that users claimed benefits in sales, customers, local trust, market stability would desire to see CC usage increase. Dissaux et Ruddick (2017) assessed the need for the institutionalization of these CCs as local monetary commons by showing mixed results regarding the institutionalization process of the Bangla-Pesa model. A list of the challenges encountered and limits of model is provided (difficulty to build trust, existing social capital models trading relations in CC, program is time consuming, challenge of stockings locally). To overcome these limits and increase usage and impact, they argued for an evolution towards the Sarafu-Credit model (backed up by cooperative assets). The new modalities and expected results are furthermore presented through the theory of change.

Moreover, Anagrius (2017) analyzed the potential of CCs to foster sustainable livelihoods and underlined that active users are able to increase their sales, savings and access to basic goods and services thanks to the CC. It also found that the networks and community activities are strengthening social contacts in the community and that the CC can help financing the management of local environmental problems. The identified challenges are related to local leadership and lack of trust, communication and consistency of rules. These challenges are also found by Dezin (2017) who perceived that that there are not direct channels of participation or decision-taking to GE and that GE does not foster the institutional capacity of the communities. His conclusion revealed that the majority of community members perceive the programs as positive in terms of sales, savings and increased trust but that there is on average a low usage of CCs, except for in certain smaller subgroups, where a high trust level was pre-existent. Finally, the quantitative research of Sillan (2017) showed a positive and significant impact of CCs on the following two lifestyle outcomes: helping the environment and gifting in professional services and goods (altruistic behavior). It concluded that CCs is a tool to support sustainable development in informal settlements and influence the lifestyle (expectations and behaviors) of the participants.

To conclude, empirical studies advocate the strong potential of CCs to foster sustainable development, the social and solidarity Economy and poverty reduction in informal settlements. Scholars argued that CCs can be used as a policy instrument for efficient interventions in social welfare, environmental and economic programs.

BACKGROUND ON FOOD SECURITY: A THEORETICAL FRAMEWORK

Food security is usually defined as a situation when "all people, at all times, have physical and economic access to sufficient, safe and nutritious food to meet their dietary needs and food preferences for an active and healthy life" (World Food Summit, 1996). Food security is a policy issue of importance and is considered as the principal outcome of food systems targeted by decision-makers.

According to Ericksen (2008), the three major components of food security are access, availability and utilization. Food availability refers to the amount, type and quality of food a unit (individual, household, community, nation etc.) has at its disposal to consume. Access to food refers to the ability of a unit to obtain access to the type, quality, and quantity of food it requires. Food utilization refers to individual or household capacity to consume and benefit from food. Ericksen (2008) defined each of these components into different elements. His definitions are summarized into the following table.

Table 3: the concept of food security

FOOD AVAILABILITY	**FOOD ACCESS**	**FOOD UTILIZATION**
Production: *how much and which types of food consumed are available through local production* Determinants: land holding sizes, resource tenancy arrangements, economic returns to labor, human capital, control local producers have over their own products	**Affordability:** *the purchasing power of households or communities relative to the price of food* Determinants: pricing policies and mechanisms, seasonal and geographical variations in price, local prices relative to external prices, the form in which households are paid, income, and wealth levels.	**Nutritional value:** *how much of the daily requirements of calories, vitamins, protein, and micronutrients are provided by the food consumed.* Determinants: diversity of food consumed, type of primary protein, disease incidence (which affects food absorption), education, facilities for cooking and pre-paring food, access to clean water and hygiene practices
Distribution: *How food for consumption is physically moved to be available, in what form, when and to whom* Determinants: transportation and infrastructure, public safety nets, storage facilities, governance, security, enforcement of trade barriers and borders of the food available to a unit is obtained through exchange mechanisms such as barter, trade, purchase, or loans rather than local production.	**Allocation:** *the mechanisms governing when, where, and how food can be accessed by consumers* Determinants: markets, government policies, social capital (informal allocation processes)	**Social value:** *all of the social and cultural aspects of consumption* Determinants: cultural customs, community and households' relations to food

Exchange: *How much of the food available to a unit is obtained through exchange mechanisms such as barter, trade, purchase, or loans rather than local production.* Determinants: income levels and purchasing power, informal social arrangements for barter, local customs for giving and receiving gifts, migration, gender and age structure, markets, terms of trade, currency value, and subsidies	**Preference:** *social or cultural norms and values that influence consumer demand for certain types of food.* Determinants: religion, season, advertising, preparation requirements, human capital, tastes, customs, and female labor force participation.	**Food safety:** *dangers introduced from the addition of chemicals during production, processing and packaging, and food-borne diseases* Determinants: procedures, standards and regulations for food production, processing and packaging.

METHODS

The Miyani-Pesa

The research study in Miyani is based on a complex system approach mixing qualitative and quantitative analyses to study the impact of the miyani-pesa on the local food system with a focus on food security issues. Besides, the study investigates the potential of CCs to integrate an agricultural value addition activity (posho mill) to the territory.

The research has been decomposed on two research phases: the first one has taken place in December 2017 and January 2018 while the second one will take place in March 2018.

Table 4: Methodology applied in Miyani

	Objective(s)	**Methods**	**Data**	**Food security components addressed**
Phase I (December 2017-January 2018)	Territorial resources analysis	Transect walk and mapping of the area	GIS data: human settlements, schools, medical center, officials, farming systems, water points and irrigation system, forests, roads, market places, posho	Food availability (production, distribution)

			mills, types of soil.	
	Analysis of (i) the users socio-economic characteristics (ii) perceived outcomes of the CC Analysis of farmers livelihoods and farming systems (inputs/outputs analysis)	Semi-structured interviews with 36 CC users	Livelihood strategies and users' characteristics; farming systems (inputs/outputs analysis); use, perceived benefits and challenges of the MP	Food availability (production, distribution, exchange) Food access (affordability, preference) Food utilization (social value)
	Impact assessment of CC on food security (especially food budget and food diversity)	15 days food consumption booklets (20 CC users and 80 non-users)	Description of the daily meals; degree of satisfaction; daily food purchase (food items and budget) in Ksh and in CC	Food availability (exchange) Access to food (affordability)
	Institutional context	Interview with Kenya Red Cross (field officer)	History of the area and the cooperative Role and activities of the Kenya Red Cross Perceptions about the Miyani-Pesa	Food access (allocation)
	Institutional context and impact of the CC on the local agricultural cooperative	Focus groups and PRA with committee members of the cooperative	History, objectives, activities, governance, challenges, outcomes of the cooperative Inputs/ outputs analysis	
	Economic sustainability of the cooperative and impact of the CC on the cooperative	Analysis of the financial records of the cooperative	Income and expenses of the cooperative (in Ksh and in CC)	
	Local livelihoods strategies and lifestyles	Direct and participatory observation;	Livelihoods and lifestyles Gender analysis	Food availability (production)

		informal interviews (participation to the daily life of the host family for 15 days and participation to some activities of the cooperative)	Analysis of the cooperative	Food access (preference) Food utilization (social value)
Phase II (March 2018)	Impact of the CC on food security and farmers livelihoods	Questionnaire and food booklet II	Wealth index Income and expenses Food source, food consumption, food access Use of the CC and perceived benefits	Food availability (production, exchange) Food access (affordability) Food utilization (nutritional value)
	Research action Impact of CC on trade relations and social networking Understanding of the concept of CC and ownership	Workshop and participatory training with the CC users (networking, communication)	Social mapping and trade relations Sense of ownership, governance and level of knowledge	
	Analysis of the context (institutional, politico-economic, environmental)	Interviews with key informants	interests, needs, challenges of local stakeholders Perceptions about the CC	Food availability (production, distribution, exchange) Food access (affordability, allocation) Food utilization (social value, food safety)

The Gatina-Pesa

The research study in Gatina is based on a complex system approach mixing qualitative and quantitative analyses to study the impact of the gatina-pesa on the local urban food system with a focus on food security issues. Besides, the study investigates the potential of VSs to foster education and food security at school (for children).

The research is based on one month of field work. Besides the academic perspective of this fieldwork, the objective is to make research action and to foster the management of the gatina-pesa as well as the networking and training aspects of the program.

Table 5: Methodology applied in Gatina

Objectives	**Methods**	**Datas**	**Food security components addressed**
Impact of the CC on food security	Distribution of one hundred food consumption booklets among 40 users and 60 non-users (for 7 days)	(i) daily expenses in food in Ksh and in CC; (ii) daily total expenses in Ksh and in CC; (iii) number of food items bought; (iv) daily income in Ksh and in CC; (v) number of people sharing the breakfast, lunch and dinner; (vi) degree of satisfaction for the breakfast, lunch and dinner; (vii) type of food eaten (cereals, beans, vegetables, fruits, sweets, meat and fish).	Food availability (exchange) Food access (affordability) Food utilization (nutritional value)
Impact of the CC on food security and livelihoods	Questionnaire distributed to the same 40 users and 60 non-users	wealth index, sources of income and incomes, expenses, food security, uses, benefits and challenges of the CC	Food availability (production, exchange) Food access (affordability)
Impact assessment of the CC on food security and livelihoods: triangulation with the questionnaire and food booklet	Informal interviews with users of the CC	Food consumption and food sources Perceived impacts of the CC	
Action and participatory research for fostering communication about the CC and networking	Focus groups and participatory workshops with (1) the headteachers of the schools members of the CC network (2) the chairmen of the cluster groups members of the CC network	Outcomes of the CC on the schools and the cluster groups (and individual savings) Perceptions about how to communicate about the CC and how to foster networking among users	
Socio-economic context and urban food system	Interviews with key informants (officials, schools, medical care, NGOs)	Socio-economic context and urban food system (trends and challenges)	Food availability (production, distribution, exchange)

		Perceptions about the CC Interests and needs of key local stakeholders	Food access (affordability, allocation, preference) Food utilization (social value, food safety)
Socio-economic context and urban food system	Direct observation at the local market (Kawangware) and description of one typical day of a woman	Food prices and food sources Typical day of a woman food street vendor	Food access (affordability, allocation)
Governance of GE, activities, roles and responsibilities of the employees of GE	Interviews with the two employees of the cooperative shop and with the employees of GE	Governance of GE, activities, roles and responsibilities of the employees of GE	
Organizational structure of the CC network and governance mechanisms	Interviews with the chairman, treasurer and secretary of the CBO	Organizational structure of the CC network, objectives and governance mechanisms	
Research action	Organization of one market day and waste management event	Challenges of organizing events in the community Impacts of the CC along an event	

PRELIMINARY RESULTS

PRELIMINARY RESULTS IN MIYANI

Socio-economic context in Miyani

The Miyani area is located in the Kwale County, which is characterized by some of the worst socio-economic and health indicators in Kenya. According to the Kenyan Government (2016), the agriculture sector plays a crucial role in guaranteeing food and nutrition security, reducing poverty, and creating employment in Kwale County where subsistence farming accounts for about 80% of the average household income. In spite of the importance of agriculture, food insecurity is a critical issue in the county: roughly 70% of the households are considered as food poor (Ibid). Reliance on rain fed agriculture makes farmers in Kwale especially vulnerable to climate shocks and changes, resulting in hunger for as much as half of the total county population due to lack of rains (Ibid).

The Miyani area is composed of six villages where the main livelihood strategies are subsistence farming and urban (casual) jobs in Mazeras or Mombasa. Typically, men are the ones in charge of being employed in the city while women take care of the farm and the house. Due to low agricultural productivity and poverty, local people (mainly women) have started small businesses besides farming for generating alternative sources of income and food.

Agriculture lands are mainly obtained through inheritance. Maize, intercropped with cowpeas, green peas, beans and/or groundnuts, are the main crops grown in the area. Crops are mainly grown for subsistence but the production is often too low to sustain the households needs over the all year. The rural economy could be defined as maize-based or rain-based. If the maize season is good, the household spends less money in food but buy more diverse food. If the maize season is bad, the

household spends more money on food but mainly buys maize flour, resulting in less diverse diets. Increased food budgets result on lower consumption power, thus on lower local economy and market.

Local businesses and local households are also heavily dependent on the external (labor/food) urban markets. Since the local food system is characterized by low yields (mainly because of increased droughts over the last years), the local food vendors replenish their stocks in Mazeras or in Mombasa while men and young people move to these cities to find jobs. Besides climate, the local rural economy is therefore vulnerable to the seasonality and volatility of these external markets.

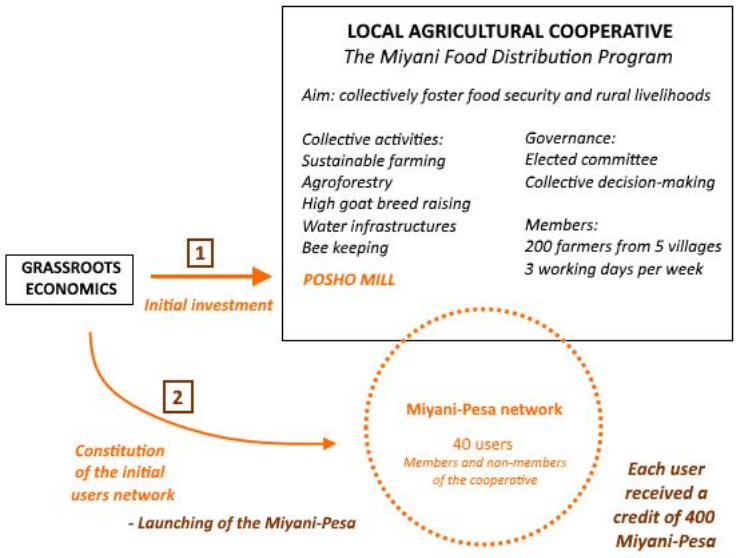
The Miyani Food program

The Miyani Food Program (also called the Miyani Food Distribution Point) (FDP) is an agricultural and community-based cooperative which has been implement in 2011 after a severe drought crisis. Supported by the Kenya Red Cross, the Kenyan Government, the Green World Campaign and the World Food Program (WFP), this cooperative aims to increase food security in the area. Two hundred vulnerable people, mainly women, are members of the cooperative and collectively work three days per week in farming and agroforestry projects. They consequently collectively generate food and alternative income they use to support their cooperative and livelihoods. Each member is paid by the WFP 2000 Ksh nine months on the year and works for free for 3 months. In terms of governance, the cooperative is composed of an elected committee members (9 members) and elected committee board (chairman, tresorier, secretary). Decisions are therefore collectively taken and decision-makers are downwardly accountable to the local communities although the existing power structures and difference in education diminished a bit the democratic features of the cooperative.

The Miyani-pesa

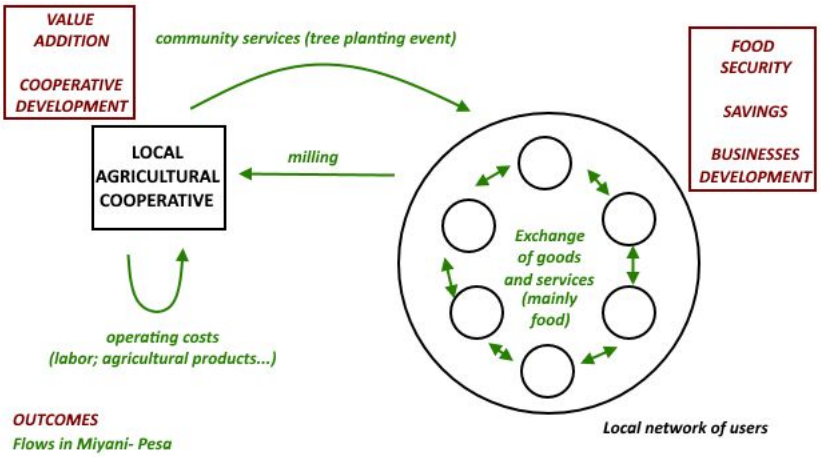
In 2017, Grassroots Economics has supported the MDP in (1) investing in a posho mill (April 2017); (2) launching a community currency (August 2017) among a network of 40 local smallholders; (3) building a market place in Miyani.

Figure 4: Implementation of the Miyani-pesa



The community currency, named the Miyani-Pesa (MP), is a commodity-based one backed by the posho milling service. Besides trading with the other local members, every user has therefore the possibility to use its vouchers of MP at the cooperative for milling his maize.

Figure 5: The functioning of the Miyani-Pesa



Positive (perceived) outcomes of the Miyani-Pesa (MP)

Although the MP is still at an early development stage, 14 out of 36 interviewees mentioned that the MP helps them on their daily food purchases by allowing them to buy food or mill their maize even when they experience a lack of Kenyan shillings. 21 respondents noticed that they could buy more diverse food thanks to the MP. A short analysis of the food consumption booklets shows that in average, the non-users spend 23 Ksh per day per household member for food while the Miyani- Pesa

users spend 41 Ksh. It must be noticed that a further analysis is needed before assuming any conclusions.

Additionally, 21 interviewees also underlined that, by using MP, they could increase their savings in Kenyan shilling. They would use the savings for paying the school fees, developing their farm and/or increasing their business stocks. For instance, one of the respondent underlined that he saved 300 Ksh since September and he could, therefore, invest on his farm by buying one chicken.

Jacob, 44 years and father of 7 children, is both a farmer and a fisherman. Cooperative's committee member, Jacob has been employed at the posho mill since February 2017. In addition of earning 100/150 Ksh per working day, he has daily received 50 Sarafu-credit since last September. Jacob expressed his enthusiasm regarding Sarafu-credit. At first, he mentioned that he could make more savings by using Sarafu-credit for his daily purchases. He would use the savings for paying the school fees while using the sarafu-credit for buying more food. He also underlined that he could buy more diverse food thanks to the Sarafu-credit. For instance, he buys more often wheat flour for making "chapatis" or rice and therefore, eats more than three times a week chapatis compared to once per week before; more than three times per week rice compared to twice per week before:
"I don't have to eat ugali every day now. I could buy more often rice, beans, wheat flour etc.".

Besides, he underlined that his business as a fisherman has been fostered: before, he received 2500 Ksh in a good day; now it earns 3700 Ksh in a good day. Jacob finally underlined that he expects these benefits to be multiplied when there will be more users.

On the other hand, while the MP orientates the local consumption of milling services toward the agricultural cooperative, the latter uses the received MP to support its operational costs by partially remunerating two of its employees at the posho mill in MP. The cooperative has also organized a tree planting event along which the participants were partially paid in MP. In the future, it is expected that the cooperative better systematizes the use of the MP by monthly paying community services such as waste collection, tree planting, water-pound digging etc.

PRELIMINARY RESULTS IN GATINA

The socio-economic context in Gatina

The sub-location Gatina is located in the informal settlements of Kawangware on the West of Nairobi. According to the 2009 Kenya Population and Housing Census, Kawangware's population was 133,286 people at this time. Most inhabitants live on less than $1 (although they earn in shillings) a day and unemployment is high.

Most of the households in the area base their livelihoods on small-scale and informal trade involving small retail shops and kiosks, hawking of second hand cars, street food vending and groceries. This means that majority of the households depends on food purchase from the market for providing food at home. It appears that purchased food on credit from local vendors is the most important coping strategies for overcoming the lack of funds for buying food. It appears that food security and water security are main issues in the informal settlement of Gatina.

The Gatina Pesa

The Gatina-Pesa was launched in 2015 by Grassroots Economics, following the interest from a group of school headmasters and teachers supported by a German NGO in permaculture. The network includes around 300 users who are all registered as members of a community-based organization (CBO) supported by GE. The CBO as a local committee should manage the network on its own, ensuring a local ownership and leadership of the CC. Besides, the CBO aims to facilitate the access of the members to loans by working as a merry-go-around. Every member should monthly save 200 Ksh and as a counterpart, could receive loans in Ksh from the community pot.

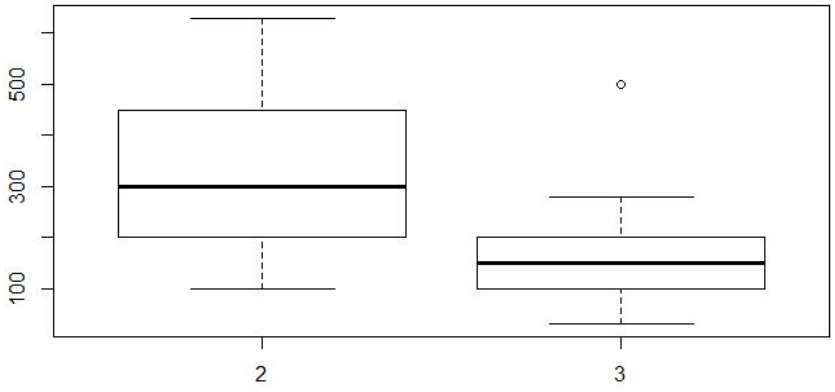
The Gatina-Pesa is a commodity-based currency backed up by a wholesale shop. This cooperative business provides stocking to 20 local retail shops (users and non-users of the CC) on a weekly basis as well as to some individuals. The main items sold at the shop are maize flour, wheat flour, sugar and baby pampers. Based on the profits of the shop, two persons are employed: the first one basically runs the shop while the second one takes orders from the local retail shops and is responsible of the delivery. These two employees have been trained by the regional business coordinator of GE.

The cooperative shop has been set up in order to regulate trade and to increase the trust in the CC and in GE as well as to make the CC program more financially self-sufficient. The users of the Gatina-Pesa, which have received a zero-interest credit of 400 CCs when becoming members, can at any time use their (excess) CCs at the shop besides trading with the local network of businesses. The cooperative shop therefore ensures credit clearing mechanisms on the network. Besides buying goods at the wholesale shop, the users have also the possibility to buy Ksh as a top-up. On the other hand, the CCs collected by the cooperative shop is put into the community pot and is used for community service work such as waste collection.

Impacts of the Gatina Pesa on food security at the individual and household levels

A preliminary analysis of 33 questionnaires (19 users and 15 non-users) shows a significant difference in daily food budget. Users of the CC daily spend on average 322 Ksh while non users spend on average 181 Ksh.

Figure 6: Boxplots about the daily normal spending on food (2: CC users; 3: non users)




```
lm(formula = normal_food_spending ~ gatina_member, data = tab)
```

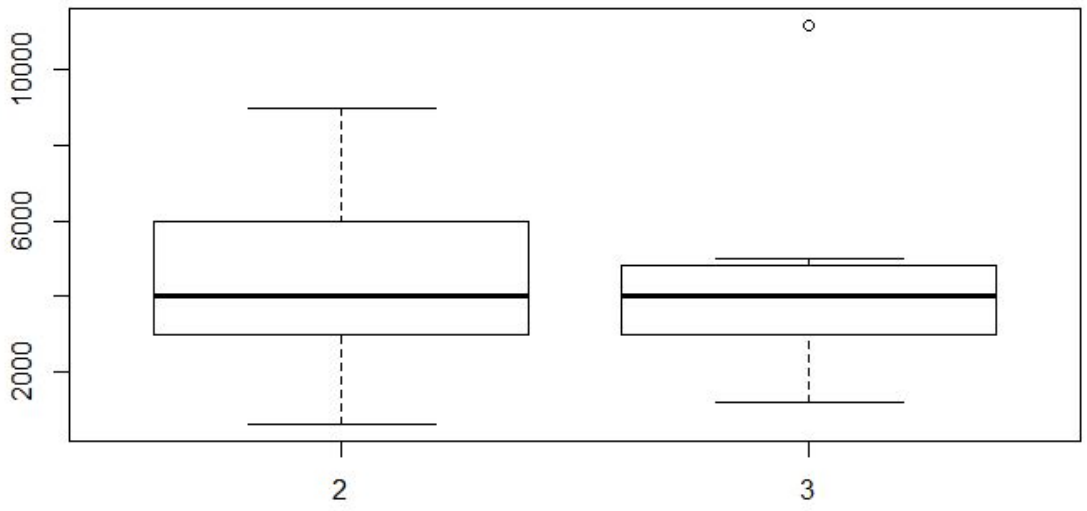
```
Residuals:
    Min      1Q  Median      3Q     Max
-222.00 -122.00  -22.00   68.89  318.89

Coefficients:
               Estimate Std. Error t value Pr(>|t|)
(Intercept)      322.00      37.33   8.626 9.66e-10 ***
gatina_member3  -140.89      50.55  -2.787  0.00899 **
---
Signif. codes:  0 ‘***’ 0.001 ‘**’ 0.01 ‘*’ 0.05 ‘.’ 0.1 ‘ ’ 1

Residual standard error: 144.6 on 31 degrees of freedom
Multiple R-squared:  0.2004,   Adjusted R-squared:  0.1746
F-statistic: 7.769 on 1 and 31 DF,  p-value: 0.008994
```

The analysis also reveals a significant difference between users and non-users regarding the monthly spending on dry food (rice, flours, beans, sugar). On average, users monthly spend 4373 Ksh in dry food while non-users monthly spend 4072 Ksh.

Figure 7: Boxplots about the monthly spending on dry food (2: CC users; 3: non users)




```
lm(formula = month_dry_budget ~ gatina_member, data = tab)

Residuals:
    Min      1Q  Median      3Q     Max
-3773.3 -1373.3   -72.2   927.8  7127.8

Coefficients:
               Estimate Std. Error t value Pr(>|t|)
(Intercept)      4373.3      566.9   7.715 1.06e-08 ***
gatina_member3   -301.1      767.5  -0.392    0.698
---
Signif. codes:  0 ‘***’ 0.001 ‘**’ 0.01 ‘*’ 0.05 ‘.’ 0.1 ‘ ’ 1
```

```
Residual standard error: 2195 on 31 degrees of freedom
Multiple R-squared:  0.00494, Adjusted R-squared:  -0.02716
F-statistic: 0.1539 on 1 and 31 DF,  p-value: 0.6975
```

7 respondents out of 15 users mentioned that the main benefit of using the Gatina-Pesa concerns food purchases. This is correlated to the qualitative data collected along the informal interviews with users: all interviewees explained that the Gatina-Pesa allows them to buy food even when the national currency is lacking. It finally appears that the Gatina-Pesa is a spending currency mainly used for daily and weekly (food) purchases.

Impacts of the Gatina Pesa on food security in schools

The network of the Gatina-Pesa includes almost 20 community-based schools. The informal interviews conducted with some of the teachers and headteachers of theses schools showed that the gatina-pesa helps running the schools. For instance, the headteacher of the skylife community-based school mentioned that "thanks to the Sarafu-Credit, the school is able to operate. The Sarafu is used to buy food, rice ... Without the Sarafu-Credit, it will be hard". At this school, all the teachers are members of the Gatina-Pesa and receive the CC as a salary advance. The school receives on average between 500 and 700 Gatina-Pesa per month as payment for school fees from around ten families. The headteacher expressed the strong interest of the school in receiving the gatina-pesa and mentioned that they would like to receive around 3000 Gatina-Pesa per month.

DISCUSSION

SARAFU-CREDIT VOUCHER SYSTEM AS A POLICY INSTRUMENT TO FOSTER SUSTAINABLE FOOD SYSTEMS AND FOOD SECURITY IN VULNERABLE URBAN AND RURAL AREAS

Based on empirical evidence from the Kenyan experiences, many scholars argued about the potential of VSs as policy instruments to foster sustainable development in vulnerable human settlements (Ruddick and Mariani, 2015; Ruddick, 2015; Anagrius, 2017; Bendell et al., 2015). Monetary innovations are strong leverage entry points for interventions in development by tackling the core issues of poverty which are the lack of money and the strong dependency towards volatile external markets (Bendall et al., 2015). By providing vulnerable people with a complementary mean of exchange, local resources can be traded and used even when the national currency is scarce and thus, the local markets can be reinforced and stabilized, resulting in resilient socio-ecological systems (Ruddick, 2015; Anagrius, 2017). Besides, VSs present a double effect on the local economy by fostering savings in national currency which could be use for reinvestments in productive and reproductive assets (Ruddick, 2017; Bendell et al., 2015). VSs allow the transition towards a bi-monetary resilient system to external shocks on which communities could based their livelihood strategies on both a spending currency and a savings and investment currency (Sillen, 2017).

Intuitively, VSs could also support food security in vulnerable communities by being an available mean of payment for (daily) food purchases. This is particularly relevant for people which heavily depends on credit for buying food as a coping strategy. The preliminary results of this research show increased (daily) food budgets for the VS users compared to the non-users. The perceived benefits are also strongly related to food security since the users acknowledge the fact that the VS helps them for buying food. Besides, by orienting the local purchases towards local businesses, VSs could foster local food systems by strengthening the local food markets and local trade relations. VSs could also be a mean to improve food provision in schools as it has been shown in Gatina. It is therefore argued

that VSs could be used as policy instrument to foster food exchange, affordability and allocation as it is summarized on the following table.

Table 6: Voucher systems and food security

Component of food security addressed	Explanations
Food exchange	The VS is a complementary exchange mechanism (to national currency, barter and credit) which foster food availability at the household and community levels. The VS could (i) increase income levels and purchasing power; and (ii) stabilize the food markets.
Food affordability	The VS levels the purchasing power of households and the community relative to the price of food. It also acts as a buffer against seasonal variations in food prices and volatile external markets. It finally could level income and local wealth.
Food allocation	The VS could be used as a policy instrument to correct market failures.

In a long term view, it is believed that VSs have also a strong potential to foster the transition to regional integrated food systems by linking the regional agricultural production to the regional food consumption through more stable regional markets. It is argued that VSs could therefore be used to build urban-rural food system by emplacing food trade relations between these areas. Besides, VSs could be used for supporting investments in sustainable agriculture and emplacing the value addition. Environmental services such as tree planting or waste management could also be internalized to the territorial economy addressing the issue of environmental externalities.

CHALLENGES OF SARAFU-CREDIT VOUCHER SYSTEMS (VSs)

Although VSs have a strong potential to foster sustainable development and food security levels among vulnerable people, many challenges still exist when it comes to scale up these monetary innovations. It appears that the levels of understanding regarding VSs is one of the main challenges faced by the Kenyan communities. Grassroots Economics is confronted to a lack of funding, undermining its abilities in terms of communication, training and marketing about VSs. This gap results in a lack of networking and misunderstandings among the communities involved and thus, the full potential of VSs is not explored yet. The overhead of printing VSs also limits GEs ability to spread them across Kenya.

CONCLUSION

Food security is a policy issue of importance and often considered as the principal outcome of food systems which need to be addressed. Global environmental, social, political and economic changes increasingly push decision-makers to use innovative approaches and instruments to address this

dynamic and complex issue of food security. It is the case in Kenya where the government faces challenges to address food security and sustainability issues in informal settlements and arid and semi-arid lands.

On the other side, the Non-Governmental organization Grassroots Economics has experienced an innovative financial service - a voucher system backed by local assets- in five informal settlements and one semi-arid rural area. Many scholars argued about the potential of this system to foster sustainable development among vulnerable communities by providing them with a complementary mean of exchange and fostering the local trade relations. However, none investigate about the (potential) impacts of the VS on food security at the household and community levels though it is a critical policy issues linked to sustainability.

This study therefore attempts to fulfill this gap by investigating two Kenyan VS cases, one in informal settlement and one in a rural area. Based on these two-case studies, it is argued that VSs have a strong potential to be used a policy instrument to address food security issues among vulnerable communities, especially food exchange, affordability and allocation. Indeed, the VS is a complementary exchange mechanism (to national currency, barter and credit) which could foster food availability at the household and community levels. The VSs could increase income levels and purchasing power; and stabilize the food markets. In terms of food access, the VSs could level the purchasing power of households and the community relative to the price of food. They could also act as a buffer against seasonal variations in food prices and volatile external markets. It finally could level income and local wealth. Finally, the VSs could be used as a policy instrument to correct market failures.

On the other side, the challenges encountered by GE show the importance of communication, networking and training, and therefore fundings and involvement of key stakeholders when setting up these financial innovations. Digital innovations, such as blockchains, are also important drivers to consider in financial innovations as it has been shown with the case of M-Pesa. GE is actually putting much effort into developing a digital voucher system that could be used by communities and government alike.

Preliminary findings suggest that treatment groups (communities using Sarafu-Credit vouchers) are consuming roughly 78% more food daily than control groups (not using Sarafu-Credit vouchers) in both Urban (77.9%) and Rural (78.2%) case studies. More researching and trials in this field are highly needed to verify these results and further explain the determinants that cause them..

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