The impact of agri-businesses on Food security in Uganda – a case study in Gulu

Inverkan av jordbruksföretag på livsmedelssäkerheten i Uganda – en fallstudie i Gulu

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Degree project • 30 hp
Swedish University of Agricultural Sciences, SLU
Department of Molecular Sciences
Agriculture program – Food
Molecular Sciences, 2022:20
Uppsala, 2022

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Credits:	30 hp
Level:	A2E
Course title:	Master thesis in Food Science
Course code:	EX8077
Programme/education:	Agriculture programme – food Science
Course coordinating dept:	Department of Molecular Sciences
Place of publication:	Uppsala
Year of publication:	2022
Cover picture:	Andrea Lundh
Title of series:	Molecular Sciences
Part number:	2022:20
Keywords:	**Food systems resilience, food security, entrepreneurship, agri-businesses, Uganda, case-study, field research**

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Abstract

Today's food system is exposed to several shocks and stresses. Resilience is a system's ability to withstand shocks and stresses and is therefore essential for food security. Uganda experiences food insecurity. The aim of the study is to examine the possibility of entrepreneurs in Gulu contributing positively to the food system for increased resilience. For analysis, a framework for resilience is used, more specific resilience of food systems, towards sustainability challenges, for food security, seen through the attributes: learning, production, networks, governance, diversity, and resources. The study has been carried out as a case study in Gulu in northern Uganda complemented with a literature review. The data was collected through semi-structured face-to-face interviews and observations from the field. The seven interviewees are students at Gulu University and running their own businesses. The result showed that businesses in Gulu contribute to increased resilience in the local food system through employment, demand for sustainable agriculture production, availability of nutritional products, and increased knowledge in the society. Though the entrepreneurs are facing challenges with seasonal variations and financial support. Lastly agri-businesses in Gulu show future potential in contributing to increased food security.

Keywords: Food systems resilience, food security, entrepreneurship, agri-businesses, Uganda, case-study, field research

Sammanfattning

Dagens livsmedelssystem utsatts ständigt för påfrestningar. Resiliens är ett systems förmåga att motstå påfrestningar, och är därför avgörande för livsmedelssäkerhet. Ett land som drabbas av otillräcklig livsmedelsförsörjning är Uganda. Syftet med den här studien är att undersöka möjligheten för företagare i Gulu att bidra positivt till livsmedelssystemet för ökad motståndskraft inom det. För analys används ett ramverk för resiliens. Resiliens av livsmedelssystem, mot hållbarhetsutmaningar, för livsmedelssäkerhet, analyserat genom attributen; lärande, produktion, nätverk, styrning, mångfald och resurser. Studien har genomförts som en fallstudie i Gulu i norra Uganda och är kompletterad med en litteraturstudie. Data samlades in genom semistrukturerade intervjuer samt observationer från fält. De sju intervjupersonerna är studenter vid Gulu University som driver sina egna företag. Resultatet visade att företag i Gulu bidrar till ökad motståndskraft i det lokala livsmedelssystemet genom sysselsättning, efterfrågan på hållbar jordbruksproduktion, tillgång på näringsrika produkter och ökad kunskap i samhället. Företagarna stod inför utmaningar med variationer mellan jordburkssäsonger och ekonomiskt stöd. Slutligen visar jordbruksföretag i Gulu framtida potential när det gäller att bidra till ökad livsmedelssäkerhet.

Nyckelord: Resiliens i livsmedelssystem, livsmedelssäkerhet, entreprenörskap, jordbruksföretag, Uganda, fallstudie, fältstudie

Acknowledgements

This thesis has not only been a writing process, but also a sensational journey. The trip to Uganda bought me cultural experiences and new perspectives I'm infinite thankful for. The academic process resulted in experience conducting field research and project planning. Firstly, I would like to express my greatest gratitude to Steven Carr my supervisor at the Agripreneurship Alliance for the time, effort and supportive advice before, during, and after my visit to Uganda. I also want to thank Dr. Anne Roulin, CEO of the Agripreneurship Alliance, and Angela Haas, working for the Agripreneurship Alliance during the study visit to Uganda, for your support and advice.

I would love to thank my private driver Emmanuel, which him I am forever grateful to for all the knowledge and shared moments during my first visit in Africa. I would like to thank Dr. Basil Mugonola, senior lecturer and Head of the Department of Rural Development and Agribusiness, Faculty of Agriculture & Environment, for welcoming me at the Gulu University and establishing my local network.

I would like to thank the interviewees for participation in my study. Thank you for your support, effort, and time. As well as to all the people I met supporting my experience and research during my visit in Uganda. Finally, I am thankful to Martin Melin and to Johan Karlsson, my two supervisors at SLU, for all support in my academic process.

Stockholm, April 2022

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Abbreviations

FAO	Food and Agriculture organization of the United Nations
GDP	Gross domestic product
GEM	Global Entrepreneurship Monitor
IPS	Integrated phase classification
FEWS	The Famine Early System Network
IPC	Integrated Food Security Phase Classification

1. Introduction

Resilience is a system's ability to withstand shocks and stresses. Today's food system is exposed to several shocks and stresses such as droughts and volatile markets. Resilience is therefore essential for food security (Tendall et al. 2015; Toth et al. 2016; Stone & Rahimifard 2018). This research aims to investigate the role of agribusinesses' strategies and practices in the food system and how their activities may affect food system resilience in Gulu, Uganda.

1.1. Background to the study and statement of the problem

The requirement of the food system to feed a rapidly increasing population has led to the delivery of a wide variety of food pushed by a capitalized, more urbanized, and industrialized society (Clapp, Jennifer 2016). The amount of food produced is adequate to feed the whole global population in relating sufficient calories produced (Ingram 2011) and the produced calories have followed the rate of the population growth (EAT Forum 2019). At the same time, the amount of people facing hunger in 2020 is between 720 and 811 million because of problem is distribution and the diet that people have accessibility too (UN 2021). This shows that while production volumes has kept pace with population growth the world has failed to ensure access to safe, nutritious, and sufficient food for all people (SDG target 2.1) and to eliminate all forms of malnutrition (SDG target 2.2) (FAO 2021). The sustainable development goal 2 aims to achieve "zero hunger". The goal is to end hunger, achieve food security and improved nutrition and promote sustainable agriculture (UN 2021). Food security concern access to sufficient calories and macronutrients. While nutrition security refer to enough micronutrient for a healthy living for all people (FAO 2021).

The state of food and nutrition insecurity is a widespread challenge in many parts in underdeveloped economies, with many countries in Africa affected. Uganda is one victim of food insecurity because of poor infrastructure, unstable markets with

fluctuation of prices, extreme weather conditions together with poor irrigation and drainage, as examples. The situation of food security in Uganda varies between regions and the most affected area are the northern and north-eastern parts (FEWS NET 2022).

Food security is an outcome of a food system and its activities, together with social and natural capital (Ericksen 2008). As the food system is a dynamic complex structure, it is constantly affected by different stressors, both external and internal, some mentioned above. Resilience is the ability to endure and to recover from unexpected occurrences (Tendall et al. 2015) To secure food and nutrition security for all people, it is important to increase and maintain resilience of the food system (Naylor 2009; Research Institute (IFPRI) 2014; Tendall et al. 2015; Toth et al. 2016; Stone & Rahimifard 2018).

In Uganda, agriculture employs around 70 % of the working population (The World Bank 2021) at the same time unemployment, especially among young people, is a big problem (AGRA 2015). While high unemployment rates are associated with crime, slums, and negative outcomes for a country's economy, it also brings possibilities for people to be drivers of job creation. A precious resource of agribusiness and agro-industry development are in other words, entrepreneurs (Ijie & Nyabam 2018). The agriculture sector in Uganda accounts for 70% of employment and provides 25% of GDP, therefore agriculture brings many possibilities (World Bank Group 2018).

A study by The Aga Khan University showed that 48% of the youth in the country wish to start their own business. In comparison, 24% answered they want to go into a career in engineering, law, teaching, or medicine. The study concluded that youth in Uganda are concerned and threatened by unemployment but have an interest to become entrepreneurs and drivers for a solution for future working possibilities (The Aga Khan University 2016).

Gulu is a city in northern Uganda exposed to a 20 year long civil war causing displacement of people and limited access to arable land resulting in a dependency on food aid. The displacement of people has caused both unemployment and food and nutrition insecurity (Branch 2008). Together with its history, the great potential with agricultural growth, the interest in entrepreneurship among the future workforce, as well as today's challenges with extreme weather and volatile markets, creates a potential, and a need, for entrepreneurs contributing to a more resilient food system in Gulu.

1.2. Purpose of the study

The aim of the study is to examine the possibility of entrepreneurs in Gulu to positively affect the food system for increased resilience.

1.3. Objectives of the study

I. Contribute to the knowledge base about entrepreneur's interaction with the food system in Gulu
II. Highlight beneficial practices for increased food security in Gulu
III. Identify future opportunities and challenges for achieving sustainable production for agri-businesses in Gulu

1.4. Research questions

I. How can practices of entrepreneurs in Gulu contribute positively to resilience in the local food system?
II. What are the main challenges for entrepreneurs in facilitating resilience in the local food system?

1.5. Significance of the study

The study may be used as an addition to previous research on resilience of food systems and food security, as well as the connections them between. In Uganda and Gulu in particular, but also in similar regions of Africa in general. The study exemplifies the potential, as well as the need of entrepreneurs and small agribusiness for increased resilience of the food systems.

2. Theoretical framework and literature review

2.1. Northern Uganda and Gulu

For 21-years, northern Uganda experienced a civil war which started 1996, the consequences of which persists today. The Ugandan government and a series of rebel movements ruined Acholiland, a sub-region in Northern Uganda, in the conflict. Gulu town is unique in the conflict and has been the base for the government and for humanitarian industry. (Dolan 2005; Boås 2008; Branch 2008). The economy in Gulu changed from a local economy based on access to state resources, to one based on foreign aid. As a result of the war, Gulu became a centre for displacement, and the city holds 130,000 people on an area suitable for 40,000 people. This number has stayed constant since 1996. The explanation is that the people who cannot find employment in the growing humanitarian economy of Gulu, move back to some of the refugee camps, still found throughout Acholiland. In the camps there are available foods rations. In the other direction, the people able, or the ones that need to, leave the camps for Gulu town (Branch 2008) and the population in the town keeps constant.

The displacement of people has resulted in limited access to land and a dependence on external food aid. The displacement of people, and insecurities has dramatically affected food production in the area and has led to high levels of acute and chronic malnutrition (Global Hunger Index 2019).

The increasing population together with lack of employment has led to poverty since the end of the war. Together with poverty slum areas have increased. The majority of the population lives in huts or similar temporary housings. Along with unemployment and growing slums, crime rates have increased in Gulu, which is in contrast to the declining national crime rate (Branch 2013).

2.2. Food systems

The term *food system* describes the processes, required inputs, and generated outputs involved in feeding a population, including growing, harvesting, processing, packaging, transporting, marketing, consuming, and disposing of food (Hawkes, 2009; Sobal, Khan & Bisogni, 1998; Wilkins & Eames-Sheavley, n.d.). The concept consists of networks for everything and everybody concerning food, including other systems as social, economic, political, and environmental ones (Parsons & Hawkes 2018) presented in Figure 1. The figure shows that the global environment, as well as socioeconomic drivers, interact within a food system with activities and outcomes.

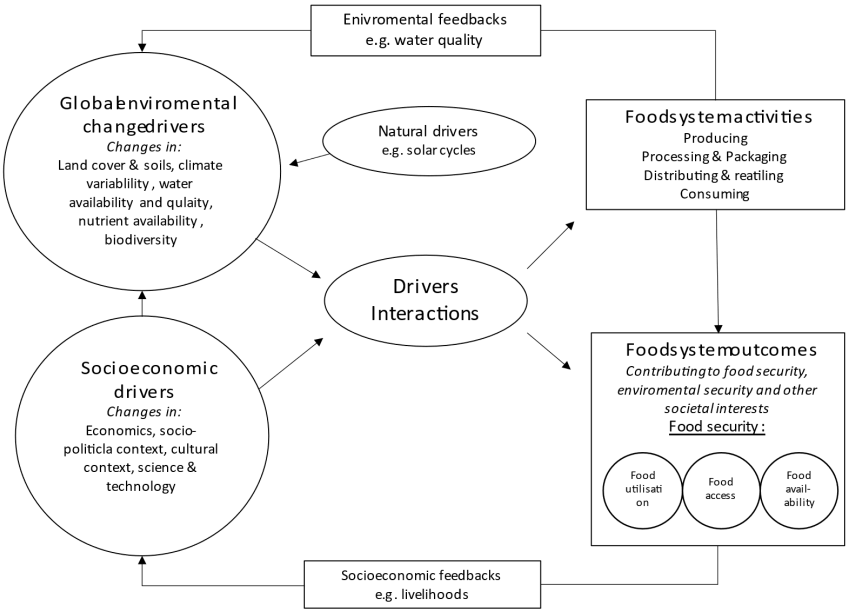

Figure 1: Food system activities and outcomes with outer drivers based on figure by Ericksen (Ericksen 2008).

2.2.1. Food systems in Uganda

Agricultural practices are widespread across Uganda, but only 25% of the people working in the agricultural sector have agriculture as their sole income. Many produce food for the family and complement the households needs with market purchases. The majority of food is produced at a smallholder and subsistence level with low use of agricultural inputs and depends on the rain seasons. Across most of the country there are two rain seasons, affecting the seasonal production and the availability as well as trade flows for some staple foods. The staples are cooking

bananas (plantain), cassava, dry beans, sweet potatoes, rice, millet, and sorghum, while the main export products are coffee, tea, cotton, cut flowers, and processed fish. Another important product is maize, which is both an important staple food and cash crop. The two rain periods allowing two harvests for beans, millet, maize, and sorghum. In comparison sweet potatoes, cooking bananas, and cassava are harvested and marketed the whole year around. The staples are important for regional food supply and trade. Uganda is self-sufficient in terms of staple food and does also export these commodities to neighbouring deficit countries. Therefore, the market dynamics, food access and availability in the country are affected by the demand, supply, and trade, in the broader region. Although Uganda is self-sufficient when it comes to staple foods the country imports other commodities such as wheat, vegetable oils, rice, and sugar for food processing industries and for urban consumers (FEWS NET 2007).

The main market for food and food products in Uganda is the local market or directly outside of farmers' houses. The market is very competitive and there are many buyers and sellers. The actors generally do not specialize on certain commodities but sell the products available and profitable at the time. The price of a product is decided after bargaining between buyers and sellers and therefore, the prices vary a lot between places and from day to day. Other factors contributing to the variation of prices are poor storage and processing facilities, infrastructure constraints and the competitive markets. Staple food is very responsive for price variation because of its dynamic character. If one product increases in price, the demand quickly shifts to an alternative product (FEWS NET 2007).

In Gulu, and in many of the northern districts, there is only one rain season a year, which leads to challenges with drought. The challenging weather contributes to limited agricultural production and the area relies on supplies from other areas because of the deficit production (FEWS NET 2022).

The food system is a dynamic structure with several components all depending on each other and the focus in this study will be on food processing and development. The availability of resources is therefore crucial, but the agricultural production is not the main focus. Neither are the distribution nor the transportation and storage, but these aspects are of course a part of the development of new businesses and food products. Food services, consumption, and waste are a part of the discussion but not the key area. Because of a competitive market there is a need of unique and value-added products in Gulu in particular, and in Uganda in general. The weak market information system, limitation in market access, poor-post harvest management, limited possibilities of processing facilitation and limited value addition are all challenges in the food system of Gulu today (FEWS NET 2007) and

the development of new food products may be a key solution in solving these challenges.

2.3. Food security in Uganda

Food security is defined in several different ways, but the most accepted definition was established by the Food and Agriculture Organization of the United Nations, FAO, in 1996 (FAO 1996). FAO refined the definition in 2002 (FAO 2002):

"*Food security [is] a situation that exists when all people, at all times, have physical, social and economic access to sufficient, safe and nutritious food that meets their dietary needs and food preferences for an active and healthy life."*

The current situation of food security in Uganda differs between regions. The most critical areas are North and North-East Uganda. As result of the COVID-19 pandemic and lockdowns the situation has worsen in the whole country and income alternatives have become limited. Wage-earning opportunities, alternative earning incomes and cash assistance from government are all constrained as result of the pandemic. Further, the Government of Uganda closed academic institutions, worship centres and daily food markets as well as banned all transportations. As result of banned transportations, commercial transport of goods and commodities couldn't reach the market. Neither could small or informal businesses access a closed market. This led to closed or downsized operations for commodity supply chains and a peak in informal and formal unemployment. These limitations and consequences have caused insufficient food access in Uganda (FEWS NET 2021). To measure food security the marker IPC is used. IPC stands for integrated phase classification (IPC 2022). In Northern Uganda many urban households reached the IPC level 2 (stressed), and the worst affected households IPC level 3 (crisis) during 2021.

As result of the pandemic, Gulu, reached IPC level 2, in almost half of the district. The surrounding districts all reached stressed levels of food insecurity (IPC 2) (FEWS NET 2021).

The pandemic caused a severe situation in Uganda but as restrictions were lifted, the market activity increased. The Famine Early System Network (FEWS) state that there has been a market increase in the availability of activities generating incomes supporting the ability to purchase food. Regardless of this, prices for sugar, cooking oil, wheat, and soap have increased because of increased fuel prices. The high fuel

prices also strain the transportation sector and affect transportation of food commodities (FEWS NET 2022).

Except the uncertainty and stresses as result of the pandemic, Uganda facing challenges with food security owning to rainfall cycles (FEWS NET 2021). A major part of Uganda are bi-modal areas with two rain seasons, but Karamoja, a region in North-west, is a uni-modal rainfall region, see the difference in seasons in figure 2.

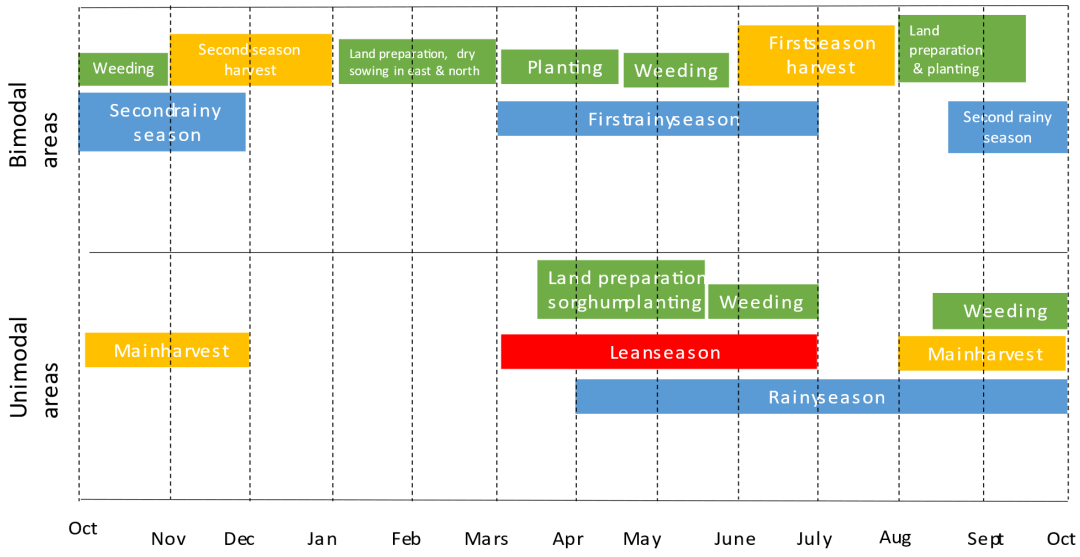

Figure 2: Seasonal calendar for a typical year based on information from FEWS NET. In bimodal areas there is two rain seasons a year while in unimodal areas there is one rain season (FEWS NET 2021).

During harvest-seasons, the food access is in general adequate in the country but because of a more extreme climate due to climate change, agriculture is facing challenges especially because of bad irrigation and drainage in the country. The income-earning and the harvest are dependent on good weather which may vary every year. FEWS (2022) predicts in general a higher income-earning 2022 compared with 2021 due to a favourable first production season and expected economic recovery. With an expected harvest in June/July above average the prices of staple food will decline and the food availability will be boosted. Still, there will be crop losses due to heavy rainfalls, but FEWS expect most of the households during 2022 to access sufficient food and income. However, when food stocks

decline and the resilience on the market decreases poor households get affected and facing difficulties in securing food.

When it comes to global markets and trade the fourth quarter of 2021 generated above average exports of sorghum while the exports of maize and beans were below the five-year average. The export of maize and sorghum to South Sudan were above average thanks to stabilisation of the exchange rate and the improved availability of hard currency. The exportation of maize to Kenya dropped because of increased competition with Tanzania(FEWS NET 2021). The prices of the commodities depend on the availability. In January the retail prices for staples as cassava and beans in bimodal areas were near or below average due to increased availability from 2021 second season harvests. Sorghum prices were significantly above the five-year average while maize prices were around average. Compared with last year, the retail prices of most staples increased(Ibid).

However, new field reports (FEWS NET 2022) suggest low crop production levels and information that crop sales are not taking place as normal. This results in households selling their assets to compensate for the below-normal food and income from crop production. These field studies indicates that in northern bimodal areas many poor households struggle to afford non-food items, with Stressed (IPC Phase 2) outcomes (Ibid). In 2022 the overall expectation is that most households will have access to sufficient food and income to cover at least their minimally adequate dietary needs. In northern Uganda in particular, as a result of two seasons with poor production, the stressed (IPC 2) level is expected to persist during spring and early summer, but the upcoming harvest is going to boost food availability and increase market supplies.

Food security is hard to predict and can always be ruined. Food security in Uganda is extra sensitive for extreme weather and global prices. Some possible future events and the outcomes are summarised in Table 1 below. These are just some examples of a possible future.

Table 1: Possible future outcomes on food security in Uganda in regard to different events (FEWS NET 2022)

Event	Impact on food security outcomes
Delayed, below average, or poorly distributed seasonal rainfall	This would reduce availability of agricultural labour opportunities and delay the of harvests. Below average crop performance would likely result in below-average production. More households would be in Stressed (IPC Phase 2), especially in the greater northern Uganda. In Karamoja, the population in Crisis (IPC Phase 3) would likely increase and food consumption gaps would widen.
Significantly above average rainfall	Early-season over-saturation of soil would likely delay ploughing and planting activities, while crop losses due to waterlogging, floods, or landslides would be likely as the season progressed. Flood- and landslide prone areas would likely deteriorate to Stressed (IPC Phase 2) with some households in Crisis (IPC

	Phase 3) due to the loss of crops and related on-farm livelihood activities. In Karamoja, the population in Crisis (IPC Phase 3) would likely remain atypically high during the harvest season.
Conflict in Ukraine disrupts global energy, grain, and fertilizer markets, resulting in rising global prices	Though Uganda produces a surplus of most staple food crops, rising fuel prices would likely contribute to higher prices of many food and essential non-food items, weakening purchasing power of poor households dependent on markets—especially in urban areas—and constraining food access. It is likely that Stressed (IPC Phase 2) outcomes would emerge in urban areas. In rural areas, higher costs of agricultural inputs could impede poor households' ability to invest in livelihoods.

When discussing food access and security the household's savings and expenditures must be taken into consideration. Except the challenges in accessing food, the expenditure for the accessed food is essential for the livelihood of the family. If a family, choose to sell or store the harvest the family's food security may differ. According to FAO, the perception of who decides in the household food expenditures vary between genders. In the study 56% of the women interviewed answered that the men decided on the expenditure on food while 71% of the men reported that the decision on food expenditure was done both by the men and by women (FAO 2018). This is worth mentioning because of potential different interests between the men and women regarding the household's spending's.

2.4. Entrepreneurship and agribusinesses

The agricultural sector has a flexible and multi-functional nature; therefore, the sector has a high potential for a wide variety of employment opportunities. As other formal sectors have failed to absorb educated unemployed youth, aspiring young people remain inactive because of limitations in motivation and encouragement to better their lives through hard work. This highlights the opportunity for unemployed to be starters of new agriculture and agribusiness enterprises and transform the rural sector and livelihoods thereafter (Ijie & Nyabam 2018).

2.4.1. Entrepreneurship

Entrepreneurship is the use of skills required for practical applications of enterprise qualities in self-employment or small start-up firms (Ijie & Nyabam 2018). Entrepreneurs, on the other hand, are people creating business who helps create jobs for other people and contribute to increased market competition (Dr.Shrivastava & Shrivastava 2013).

The Global Entrepreneurship Monitor (GEM) is a research program assessing the national levels of entrepreneurial activity in different countries, both in countries

with developed and developing economies. The program aims to explore the role of entrepreneurship in national economic growth and to understand how entrepreneurship and different types of entrepreneurship, affect the development of the country (Dr.Shrivastava & Shrivastava 2013; GEM 2022).

GEM distinguishes two types of entrepreneurships. Entrepreneurship activity can be either "opportunity entrepreneurship" or "necessity entrepreneurship". Opportunity entrepreneurship is when a business is started because of a raised business opportunity, while necessity entrepreneurship is when a business is created because there are no other employment options. Both these types are higher in countries with a developing economy (e.g. Uganda) compared with countries with a developed economy (e.g. Sweden). In developed economies the relationship between entrepreneurship and economic development is positive but in developing, economies necessity entrepreneurship and economic development is most likely negatively correlated (Kelley et al. 2011; Dr.Shrivastava & Shrivastava 2013). Therefore, it is important to enable entrepreneurs to move beyond necessity-driven entrepreneurship towards opportunity-driven entrepreneurship. In other words, going from informal micro-businesses with very low success rates to small businesses supported by innovation that caters for market and sustainability needs.

Uganda is one of the most entrepreneurial countries in sub-Saharan Africa. By 2013 GEM presented a survey (GEM 2013) revealing there are 1,8 million informal firms in the country but at the same time not even 50 % of young Ugandans have the knowledge or encouragement to go into entrepreneurship. However, almost 30 % were in the early state of running a business. Nevertheless, GEM clarifies that young Ugandans lack knowledge about governmental and other arrangements for support in their businesses. The entrepreneurs need education and available equipment to be able to manage commercial enterprises (GEM 2013).

2.4.2. Agribusiness

When entrepreneurship is applied in agriculture, the term agribusiness is used. Agribusinesses are all businesses connected with the production, preparation and sales of farm products (Cambridge dictionary 2022). When talking about the entrepreneurs active in agribusiness, the term agripreneur is increasingly used (Dabson & Markley 2010).

Agribusinesses have several different functions in society (Van Huylenbroeck et al. 2007) and specified in three different areas; economic, social and environmental.

The economic function: Agriculture activities contribute to operation and growth for the whole economy. Determinants of importance for the economic function are

capability and complexity of market development as well as institutional development.

The social function: Agriculture plays a role in improving life for rural residents. Not least assuring survival and wellbeing. For societies in general, the social function has a role in identity, due to historical origins in rural life and agrarian communities. The expertise and knowledge from local communities are fundamental for the future of agriculture, and for social viability the cultural heritage must be maintained.

The environmental function: Agriculture can both harm and benefit the environment. For critical global environmental problems such as climate change, biodiversity loss, water quality and availability, pollution, and desertification, it is relevant to optimise agriculture to climate change and to not harm the environment.

Growth of agriculture benefits both on local and national levels, see Table 2, and an agribusiness approach will have a step change in food systems (Ashley & Maxwell 2001).

Table 2: Benefits of agricultural growth on farm economy, rural economy and national economy (Ashley & Maxwell 2001)

The benefits of agricultural growth on farm economy, rural economy, and national economy	
Farm Economy	Higher incomes for farmers including smallholders. More employment on-farm as labour demand rises per hectare, the area cultivated expands or frequency of cropping increases. Rise in farm wages
Rural Economy	More jobs in agriculture & food chain upstream and downstream of farm More jobs or higher incomes in non-farm economy as farmers and farm labourers spend additional incomes. Increased jobs and incomes in rural economy allow better nutrition, better health & increased investment in education amongst rural population. Lead directly to improved welfare, & indirectly to higher productivity More local tax revenues generated & demand for better infrastructure–roads, power supplies, communications. Leads to second-round effects promoting rural economy Linkages in production chain generate trust & information, build social capital & facilitate non-farm investment

	Reduced prices of food for rural inhabitants who buy in food net
National Economy	Reduced prices of food & raw materials raise real wages of urban poor, reduce wage costs of non-farm sector Generation of savings & taxes from farming allows investment in non-farm sector, creating jobs & incomes in other sectors Earning of foreign exchange allows import of capital goods & essential inputs for non-farm production Release of farm labour allows production in other sectors

Important mentioning is that not all agriculture is agribusiness. If a family is producing food for own consumption, they produce for own purposes. It's when the agriculture practices meet the market as the term agribusiness is appropriate.

2.5. Resilience

The transition towards a more globalised food system is positive for economic efficiency, but also generates significant negative social and environmental impacts (Toth et al. 2016). Unstable global markets and a more extreme climate because of climate change, increases the need for resilience in food systems. Resilience is the ability of a system to cope with challenges. Broadly it can be defined as the dynamic capacity to continue despite disturbances and shocks (Tendall et al. 2015).

Originally the term was introduced by Holling (1973) as the capacity of ecosystems to withstand perturbations and succeed staying in the original state, reviewed by Gunderson (2000), Folke (2006) and Scheffer (2009). Holling (1996) further studied the area, recognizing that a system can be brought over a threshold causing the system to enter a contrasting state instead of the original one. Holding defined the concept as ecosystem resilience and differentiated this concept from the previous ones, which he named engineering resilience.

Today resilience is a valuable concept but hard to measure (Cabell & Oelofse 2012). Cumming (2005) explains that resilience is hard to operationalize due to its multi-dimensional nature. The fact that a system is resilient today doesn't mean it is so in 20 years or tomorrow because the larger dynamic system in which it is incorporated, may change (Holling 2001).

2.6. Food resilience, food security, food sustainability

In defining the resilience of food systems, it is important to distinguish between food resilience and food security. Food security is an outcome of a food system (Ericksen 2008), while food system resilience, is an ability property of the system. Food system resilience is often understood as the ability of the system to produce a state of food security. Food resilience can also be discussed from a household perspective as the ability of a household to maintain a certain level of well-being by withstanding shocks (FAO 2002). Additionally, sustainability is a quality of the food system and emerging over time from a resilient system (Campbell 2009).

In this thesis, food security will be discussed as one of the outcomes in relation to resilience, but the framework used is based on resilience capabilities.

2.7. A conceptual model

Based on theories of resilience, applied with a food system lens, a conceptual model is presented in Figure 3.

Figure 3: Framework to access resilience of food systems in northern Uganda for this research specific case

The framework distinguishes resilience to challenges for a food system from the system's ability to deal with the unknown, uncertainty, and shocks (Meuwissen et al. 2019). Resilience is addressed by Carpenter et al. (2001) and Herrera (2017) i.e. 'resilience of what', 'resilience to what', and 'resilience for what purpose'. In addition to these three questions, this study includes the question: What enhances resilience. In other words, resilience attributes. Other studies distinguish certain capabilities of resilience (Walker et al. 2003; Folke et al. 2010; Anderies et al. 2013) as well as distinguish the question "resilience for whom" (Quinlan et al. 2016; Meuwissen et al. 2019). In this study, the local food system and the entrepreneur's impact for increased resilience are of interest.

2.7.1. Resilience *'of what"*?

In this thesis, resilience of food systems is analysed. The food system is a dynamic whole with several components and actors producing private and public goods, explained in detail in the previous chapters. In relation to the aim of this study, to analyse the positive effects on resilience by local entrepreneurs in Gulu, the local food system in Gulu is in focus. In other words, how do these entrepreneurs and businesses impact their surroundings and the local society? As food systems are made up of interlinked agricultural, ecological and socio-economical systems the activities within the system can have multiple effects, e.g. through employment and income creation, network effects, learning possibilities, resource use, landscape impacts, and emissions. In this study the resilience of the local food system is analysed, and the resilience of each business contributes to the resilience of the larger system. Therefore, the resilience of the business themselves is also an aspect of the discussion.

2.7.2. Resilience *'to what"*?

Environmental, economic, social, and institutional challenges are all threatening a resilient and stable food system. Examples of challenges for the food system of Uganda are extreme climate causing droughts, heavy rainfalls, and hard winds, fluctuation of prices and an unstable market due to seasonal variations, constraining availability of products, competition and low number of value-added products. Shocks and stresses can be both temporary, as well as seen as more long-term impacts on the food system. While temporary effects can be a disease outbreak where the production can re-adjust afterwards. When affected by stresses and shocks the vulnerability increases in unregularly ways, resulting in higher chances of tipping points.

2.7.3. Resilience for *'what purpose"*?

The identified functions with the food systems can be seen as private versus public goods. Private goods are the production of food and food products, but also ensuring a reasonable livelihood for people and improving life-quality through employment and decent working conditions. Public goods include animal welfare, ensuring thriving rural areas, and well-kept natural resources as examples. This study aims to analyse the resilience of food systems in order to determine what is needed for food security in Uganda. Food security is a public good and will be the main focus when discussing resilience in this paper.

2.7.4. Resilience attributes

To reach resilience there is a need to discuss what enhances resilience. Meuwissen (2019) explains resilience attributes as "the individual and collective competencies and the enabling (or constraining) environment that enhance resilience" (Meuwissen et al. 2019). Cabell and Oelofse (2012) identified thirteen attributes compiled on >50 previous references of resilience literature (Darnhofer 2010). In this study, attributes are chosen based on Cabell's and Oelofse's, but further specified for the explicit system that is analysed. Five attributes are chosen: Learning opportunities, Agricultural production, Networks, Enabling environment, Diversity, and Resources. These five are discussed in the SURE farm (sustainable resilient EU farming systems) resilience framework (Meuwissen et al. 2019). As well as pertaining to resilience of a farming system, these attributes are closely fitted to food systems and the agripreneurial activities. Even if links between resilience and the attributes are proven (Cabell & Oelofse 2012) it is important to mention that these relations are not universally applicable but must be adapted to the relevant conditions. This study focuses on attributes based on food systems literature (Pinstrup-Andersen 2009; Research Institute (IFPRI) 2014; Tendall et al. 2015; Toth et al. 2016; Lokuruka 2020; Taufiq & Ismail 2020).

To conclude, this paper will discuss the resilience of local food systems, towards stressors such as seasonal variations and competition, for food security, influenced through; learning, production, networks, enabling environment, diversity, and resources.

3. Methodology

This chapter aims to present the choices that shaped the process of this study. The empirical data was collected during a field study in Uganda. A case study approach was chosen, and qualitative data were collected through personal interviews and observations in Uganda. The data analysis was informed by previous literature on; the situation in Uganda and Gulu as well as food system, resilience, and entrepreneurship theory. Finally, the chapter covers some ethical considerations.

3.1. Research strategy

For this study, an explorative approach was chosen. The aim of the study was to examine the relationship between the entrepreneurship in the agri-food sector and the resilience of the food system in Uganda. If the aim of a study is to cover a new phenomenon or, a persistent one together with an upcoming interest, it is suitable to choose an explorative strategy (Babbie 2010). Food security is not a new phenomenon but a consistent problem. On the other hand, the relation between entrepreneurship and food security has only been studied to a limited extent previously. With this said, it represents a new set of solutions for food security and there is a need for future research in the area.

3.2. Literature study

Together with the case-study a literature study was performed. This was to gain additional information about the concepts used (i.e. food security, resilience, and entrepreneurship) as well as information about the country itself. Knowledge about climate, culture, markets and economic structure together with historical information about Gulu and the agricultural development in the city, were collected through previous publications and reports. The literature research was performed throughout the whole study as understanding of the field work changed.

3.3. Case study

This study has been carried out as a case study in Gulu in northern Uganda. According to Yin (2009): "*A case study is an empirical inquiry that investigates a contemporary phenomenon (the case) in depth and within its real-world context, especially when the boundaries between phenomenon and context may not be evident*". For investigation of the relation between the local food system and agripreneurs in Gulu, the case study approach may be relevant.

3.3.1. Choice of case

The reasons for investigating the relationship between the local food system resilience and the activities of entrepreneurs are several. The literature indicates a potential of agriculture in creating incomes, food and nutrition security, economic development as well as a potential to be a key driver in positive environmental sustainability change (Research Institute (IFPRI) 2014; FAO 2021) all contributing towards a more resilient food system. At the same time, agripreneurship may contribute to positive social development such as gender equality (FAO 2019). The key objectives should determine the sampling method of a study (Robson & McCartan 2011) and the mentioned objectives justify the choice of the process of sampling. The choice of case emerged from the cooperation with the Swiss-based organisation 'the Agripreneruship Alliance'. The organisation operates in several countries and locations in Africa, including in Gulu. Their operations and contacts in the region together with the relevance of the aspects mentioned motivates the choice of case.

3.3.2. Interviews

In a case-study interviews are an important source of information (Yin 2009). The interviews help with both explanations and give valuable details of the context. The choice of semi-structured interviews is to allow the researcher to be flexible and adapt the interview depending on the given answers. Being open-minded for unexpected details may improve research outcomes (Robson & McCartan 2011).

This project is based on several methods for collecting the data: semi-structured face-to-face interviews, observations, and secondary data. The secondary data comprises population data received from Emmanuel my private driver, Anne Roulin, and Steven Carr both representatives for the Agripreneurship Alliance and other people during my stay in the country. The secondary data supports the primary data and is important background information.

The interview questions were derived from the theoretical framework used and can be found in Appendix 1. The interviews aimed to collect information about the entrepreneurs' activities and their relation to different resilience attributes. The questions also aimed to investigate the challenges the entrepreneurs are facing in concern of the attributes. Furthermore, the aim was to evaluate the entrepreneurs' business relations and their impact on the food system.

3.3.3. Interviewees

All interviewees are students at Gulu University studying the Master programme agri-enterprises development. As a compulsory part of the education, all students have to start a small business. To help the students all were offered a loan to start their businesses. All interviewees have also been taking part in the Agripreneurship Alliance Entrepreneurship in Agribusinesses course. This course is held by Agripreneurship Alliance at universities (or digital) for aspiring entrepreneurs in agribusinesses with the goal to come up with a viable business model. Names of potential interviewees were provided from Dr. Basil Mugonola who is the senior lecturer and Head of the Department of Rural Development and Agribusiness, Faculty of Agriculture & Environment at Gulu University. All students on the list where contacted and the ones answering my request where interviewed.

3.3.4. Direct observations

A common part of a case study is observations from the natural setting of the case (Denscombe 2010). The present case study included participation in a training of trainers' course with Agripreneurship Alliance, visits to several universities across Uganda, visits to different farms, and the possibility to communicate daily with local people. The observations helped me understand and deepen my knowledge about Uganda and were used for the collection of tangible facts.

3.3.5. Ethical considerations and risk assessment

When it comes to choosing of strategy, the research ethics are of concern. The first aspect is that no one should suffer harm when participating in the research (Denscombe 2010). Ethical aspects occur during the process of research in different ways. It includes the treatment of participants as well as considering privacy, confidentiality, and anonymity. All interviews were performed with approval from all people involved, as recommended by Robson (2011).

Ethical considerations also concern the direct observations that were performed, and these need to be addressed (Robson & McCartan 2011). The study only contains vital information connected to the study, and not information that violates

with the interviewees' integrity. The intention of the project was first presented to Basil Mugonola, Head of the Department of Rural Development and Agribusiness.

Furthermore, a widespread challenge in all anthropologic and field research is the differences in culture, norms and ethnical origin between the researcher and the study participants. In this study my role as a young white female researcher in Africa truly is a fact of consideration in the method of the study. Laine (2000) explains that our age, gender, marital status, ethnicity, etc. affect whom we have access to. African society is highly gendered and as women, there are fundamental expectations that you conform to local cultural norms. This was realized throughout the study. At the same time as I'm a young woman, I'm a white researcher, another fact of consideration in the method of this study. Due to perceived affluence and education, I have high status in Africa. My role as researcher, regarding the mentioned aspects, generate both vulnerability and high status in equal measure. The awareness of the role of the researcher, especially in a field study, is important for situational awareness and assessment of risk. A self-awareness of my role helps realising what roles and regions that may enter or exit from the field (Laine 2000).

3.3.6. Quality assurance

The interviews in this project were conducted as semi-structured face-to-face interviews. During each interview, a presentation of the research is held and information about the topic as well as questions is prepared before to generate trustworthiness recommended by Robson and McCartan (2011).

3.4. Data analysis

The data collected through the interviews was presented and structured based on the capabilities chosen in the used framework. Below I present the expectations of the result for each capability. The aim with the interviews was not to analyse each individual actor but to get a holistic view of entrepreneur's activities in relation to resilience.

Diversity:
The purpose with this section is to get an understanding about how diversity aspects regarding the business can contribute to resilience in the food system. Why is a diverse company important for resilience? May it contribute with increased biodiversity in the region? Or diversity of employees, suppliers, and available products?

Production:

My expectation is to clarify the environmental impact and the social impact in relation to the business production because the supplier is an important channel how the entrepreneur directly relates with the resilience of the food system in form of employment, salary, knowledge, local employment, networks/cooperation and the use of local resources. Can entrepreneurs drive sustainable development by contributing with sustainable products on the market contributing to resilience?

Learning opportunities:
My expectation of this topic is to get a deeper understanding of how the business activities can contribute to with increased knowledge in the food system. Knowledge contributing to all the three resilience capacities and is a direct channel to employees, suppliers, customers, consumers, neighbors and entrepreneurs in between. How does this company work and contributing to sharing and teaching knowledge in their work? What is the importance of teaching business and entrepreneurship?

Networks:
Combining the dots, business with other stakeholders. In this section I want to investigate the direct links between the entrepreneurs and the food system. How does the network and cooperation look like? In addition, I will ask whether the entrepreneurs perceive their networks as good enough for succeeding with their business. Are there enough network possibilities to support the business in facilitating resilience in the food system? Is something lacking to support the business?

Resources:
This section is important for investing challenges for entrepreneurs contributing to resilience. Which resources and capital around them are available and what is missing? What are the risks? What is lacking in contribute to enhancing resilience according to the chosen attributes? I'm hoping to discover how resources can help spreading risks and contribute to robustness. Lastly, I will investigate if capital for the business is coming from different sources – which will enable flexibility in the company.

Enabling environment
In this section I want to hear more about the support, rules and practices in the food systems. Is the current environment supportive for the entrepreneur? What kind of support is there? Regarding loans and subsidies? Regarding spread of knowledge? What are the norms and how is the working climate?

4. Results

In this chapter, the results in the study are presented. The result consists of the answers of each interview, a thematic conclusion based on the chosen attributes, and some field observations. The interview questions can be found in Appendix 1.

4.1. Interviews

In the following sections, each interviewee and their business are presented. A short background presentation of each entrepreneur together with some key features for their business is presented. Firstly a short information summery are presented in table 3.

Table 3: Short information summery of each interviewee's businesses

Interviewee	Esther	Alfred	Edmond	Edward	Beatrice	Lucy	Helvi
Name/type of the business:	Honey	Pork	Mushrooms	Chickens	Dried fruit	Freshly pressed juices	Shea butter products
Type and number of different products and services:	1	2	1	4	3	4	2
Novelty/specific focus:	New type of packages, flavour addition	N.A.	Domesticated mushrooms	Consultancy in poultry production	Preservation of fruits	Mixed fruits and unprocessed juice	N.A.
Number of owners/employees:	4	4	3	6	2	5	3
Number of suppliers:	Several (collective)	Several, different each week	1	2	Several	Several	1

Ways of marketing:	Social media, wort of mouth	Word to word	Word to word, social media	Costumers find him thanks to a radio show	Word to word, social media	Word to word, by standing at the University	Word to word, social media
Form and number of markets/sales channels:	People in the surrounding area	Local market, neighbours	Students, lectures, households around huts	Local market, people in the surrounding area	Grocery markets, supermarkets, students	At University, walking around selling the products, short time-contracts at different places	Students, lectures, cosmetic shops and saloons in Gulu,
Ways of financing/support:	University loan	University loan, village savings	University loan	University loan, loans from friends	University loan	University loan, Agripreneurship Alliance	University loan, Agripreneurship Alliance
Challenges:	People's perception, financial support	Water supply, financial support for machines and other equipment	People's perception, long transportations of raw material	Policies, support from government	People's perception, storage possibility	People's mindset, financial support	Certifications

4.1.1. Esther Joseph

Esther is a 27-year-old woman from Tanzania. Her family still lives in Tanzania, and she is the first born out of three kids. Esther is passionate about agriculture. She likes the practices of it, to follow a seed to become something bigger, but she's also mentioned the value in getting money from the agriculture practices and she sees the earnings as a very important part of it. Esther drives a honey business selling honey in easy pourable bottles, with a vision to produce honey with different flavours; lemon, vanilla, and strawberry. Esther buys the honey from a collective of different suppliers in the Arua region. Honey production is a production favourable for the climate because it promotes the conservation of trees and

increased biodiversity. Further, the dry seasons are a problem. During dry seasons the produced honey is not sweet enough. The business shares information with customers, and surrounding communities about the health benefits with honey. They also spread information about flavoured honey as well as the benefits with the pourable bottles based on experiences from their home countries. At the same time, Esther mentions that one of the main challenges with her production is the mindset of people in Uganda. Her perception is that people are very conservative when it comes to food and culture. In Uganda people are not used to flavoured honey packaged in innovative packages, and therefore becomes sceptical. The Ugandans believes in their traditional honey and believes that it is a perfect product.

4.1.2. Alfred Onen

Alfred is a 32-year-old man born in Gulu. He studied his undergraduate in economics and management at Uganda Christian University in a city named Mukono that is located in the central region of Uganda. After, he moved back to Gulu for studies in agri-enterprises development at Gulu University. Alfred is married and has four children, two girls and two boys. He also has two brothers. His passion lies in teaching, and he volunteers as a teacher at his free time. Alfred runs a pork business, selling fresh pork meat and piglets. Alfred mentions a will to sell value-added products in the future. The business sells its products to people in the neighbouring areas, the products are sold face-to-face, and Alfred finds the customers at the local market where he offers visitors and sellers his products. He is not selling the products at the market, but he is using it as a platform for finding customers. For a sustainable production, Alfred mentions that he faces difficulties in keeping pigs during dry season because of a lack of water. As he does not have access to water at the farm, pigs die because of lack of drinking water during dry seasons. Except for the loan from the University, Alfred is a part of a village saving initiative, which works as a village-bank. All participants pay every month to be part of the cooperative and through this they lend money to each other which allows one and each to invest at some point. To develop the production and to start with value-added products Alfred lacks machines, a cold room and fridges. He explains that the loans are not enough for these investments. Alfred runs the business with his family and in cooperation with neighbours, which constitute the social capital for the business. He also gets support from other entrepreneurs by shared knowledge and experiences.

4.1.3. Edmond Nyaki

Edmond is a 28-year-old man from Cameroon. As his undergraduate he studied Agriculture and Environmental Engineering in Cameroon. He is interested in

research development especially in agricultural value chain analysis and technology adoption in agriculture and its contribution to food security. His passion lies in community transformation and in activities directly influencing food and income security. He is the last born out of three children. His dad has passed, and his brother and sister are married. No one in the family was involved in his business. Edmond produced oyster mushrooms in two huts besides the university. The business is founded by Edmond, a woman from Kenya and a man from Zimbabwe, all owning the business together. The business supplier was Ugandan Industrial Research Institute who is producing the mushroom sponges in bags in Kampala. The product was sold in the university community. The customers were mainly students, lecturers, and households around the university. The community was very interested in the mushroom cultivation, and the business shared knowledge about the production and the positive outcomes of mushroom production. Edmund explains that the production of mushrooms is a climate-smart production, with low use of water and no in-organic fertilizers. It is also resource-efficient by using cotton husks, which are a by-product from a cotton processing company, as substrate for the mushroom. At the moment, they don't collaborate with any collectives and don't know about any regarding mushrooms, but they have talked to some NGOs about training farmers in mushroom production. The business faced challenges with delivers of mushroom bags from Kampala. Even if they placed an order on sponges, it took a long time to deliver the products which created an uncertainty in the production. Edmund explains that another challenge is in people's perception of grown mushrooms. People want mushroom from the wild and do not favour domesticated mushrooms. According to Edmond, this is closely linked to a knowledge gap, and he thinks that inclusion of the community in production can help decrease this gap and change people's mindset. Unfortunately, the business couldn't withstand the pandemic.

4.1.4. Edward Ottira

Edward is a 29-year-old man born in a small town in northern Uganda. His undergraduate was in entrepreneurship at Makerere University in Kampala. He's the last out of eleven children. His dad struggled to pay for his kids' education. When Edward was 14 years old, his dad passed away. Since then, he had to pay for himself and has done so until now. As he is the youngest, he had to struggle most when his father passed away and Edward thinks that this formed him. He got scholarships for his education but had to work besides school. He had several different jobs and started a couple of small businesses. Now, he runs several business and one of these is a poultry and consultancy business. Edward has two passions in life, one is business and the other is youth empowerment. Edward runs a registered business with 5 employees which are both males and females. For Edward it's important to ask his employees what they want to do for themselves,

and he believes it's important that future entrepreneurs are responsible for the economy, run the business and that they learn by doing so. Therefore, he encourages them to start their own business after a time working for him. The business builds on two parts. One is the poultry production and the other is consultancy in poultry. The products in the business are chickens (bids), eggs and chicken meat. Through its consultancy activities, the business offers the supervision and knowledge management. The products are sold at the local market, and to friends in the surrounding village. Many of the customers find him thanks to his participation in a radio talk show talking about his business. Edward is keen about collaborations, and he collaborates with restaurants, friends, a network of poultry farmers and an NGO. The NGO connected him to young people and supported him financially for training them. To reduce costs in his production he nowadays feed the animal with more innovative, low-cost feeds instead of traditional expensive ones. He gets food waste from restaurants for free and gets cereal bran from a mill close to his home for a fair price. According to Edward, there is a lack of governmental support for entrepreneurs in Uganda. There are loans but they are very expensive. Instead, Edward prefers loaning money from friends. The registration process for a new business is expensive as well, and the process takes a long time.

4.1.5. Beatrice Alela

Beatrice is a 37-year-old woman from a village in northern Uganda called Lira. She studied a Bachelor of Science in Agriculture sciences at Uganda Martyrs University in Nykozi, a city in the central region of Uganda. After she studied a post graduate diploma in project planning at Gulu University, and now she is studying Agri-enterprises development at Gulu University. Beatrice is a single mother with one daughter. At the moment her daughter lives with her mother in Lira. Beatrice is passionate about studying and has always sponsored herself and her studies. She is also passionate about agriculture and farming and has a farm in Lira. She wants to start a viable business at home as a complement to her future salary. To preserve, and pro-long fruits self-lives Beatrice's business idea is to dry fruits. To reduce waste, when the fruits don't reach the right quality, the thought is to produce powder or juice out of these. Her driver is proper utilization of the food, as well as at the same time to reach a wider market as she can offer different products. The fruits are bought from surrounding farmers in the Kitgum district and Beatrice's mother helped her get in contact with these. The suppliers vary between the purchases because the company requires a constant supply. Different fruits are brought from different farmers. As packaging Beatrice wants to use paper packages instead of plastic ones to reduce environmental impact. When it comes to the residues, they are going to discard the food waste at one place to concentrate the presence of flies to reduce the spread of diseases. Also, they will separate the waste to enable

upcycling of the waste. For example, banana peels can be processed to fertilizers or become animal feed. The business has a vision to train their suppliers. Beatrice wants to encourage their suppliers to plant trees helping to reduce the wind and reduce problems with sandstorms. To plant trees also helps preserving the surrounding environment and contributes with carbon sequestration. Beatrice's experience is that there are resources in Uganda, but farmers lack knowledge. She will share her knowledge about improved agriculture practices such as: collection of water during rain-seasons to store for dry season, mulching with dry grass or coffee husks to preserve water content in the soil and use of inputs such as fertilizers and pesticides. Beatrice will also contribute with knowledge by training the future workers on how to process the products and the customers about the health benefits with the products. Beatrice mentions that she is facing challenges with people's perception. People in Uganda are not willing to pay higher prices for processed fruit. The farmers are not willing, and can't afford, to buy the products, and they must sell the products at other markets such as in Kampala. Her new product requires explanation and advertisement.

4.1.6. Lucy Aciro

Lucy is a 28-year-old woman from Gulu. She lives with her husband and their two sons outside of Gulu city in a house and have a farm in a nearby district where her husband is born. She studied her bachelor's in economics and now she is studying a master in agri-enterprises development, both at Gulu University. Her family is supportive to her business but want her to get a "real" job and they think that the business is not enough. She explains that in Uganda people look at small businesses as something for the un-educated, but Lucy doesn't agree. She thinks that it is a poor perception about business. For her, the value of having her own business is the freedom it brings, and the contribution of an earning each day and not only in the end of the month. Lucy comes from a humble background, and her father grew pigs to pay for the children's school. Her passions in life are social entrepreneurship and rural development. Lucy is running a business pressing fresh juice with high nutritional value thanks to a mix of different fruit and vegetables and the absence of high processing. The business sells their products inside campus at the main gate in university. Sometimes they get other contracts and stands one day at a certain location selling their products. Lucy buys the raw products from local farmers, which are trained to grow organic fruit and vegetables. In the beginning, they brought low quality fruit, but as two of the employees in the business studied agriculture they shared knowledge with their suppliers, which increased the quality. Lucy explains that they are happy about them teaching and appreciate the shared knowledge. The employees in the business also share knowledge about juice processing with students at campus and at a hospital where they share the

importance of nutrition value in fresh juice compared with pre-packed highly processed. Lucy collaborates with several different institutions and mentions the value with the university, both regarding financial support in form of the loan and the contribution from the Agripreneurship Alliance, as well as with contacts. Thanks to the university they started a cooperation with Ruforum. As challenges, Lucy mentions that costumers are not flexible and that they don't care about nutrition. They just care about taste and want their pure passion juice!

4.1.7. Helvi Unoveene

Helvi is 31-year-old women from Namibia. Her undergraduate is in Agricultural science in the area of animal science from the University of Namibia in Windhoek, the capital of Namibia. Helvi is the first-born child, and she has three brothers and five sisters on her father's side as well as two brothers on her mother's side. Her passion is to advocate women empowerment and she feels a responsibility towards society to educate women. Helvi drives a shea butter business together with two other Ugandan women. The business contributes with working opportunities for three young women. Helvi clarifies that they aren't employed because the business is not yet registered. The products are sold at several different markets and to several different customers such as students, lecturers, and in cosmetic shops and saloons in Gulu. They are marketing their products over social media and by word-of-mouth. The shea butter is brought directly from one old lady driving a social enterprise employing other women. The old lady is producing the butter and the other women collects the shea nuts. Helvi explains that the lady contributes with knowledge to many and that she thought Helvi a lot about processing and production of shea butter. At the same time, Helvi shared knowledge about running a business and how to reach a market. Helvi also contributes with knowledge by teaching youth what the lady teaches her, as well as the value of trees and benefits with Shea nuts.

4.2. Thematic presentations of interviews

The interviews captured data both about individual experiences and collective experiences among all or some of the entrepreneurs. This section presents the experiences that were in common for several interviewees, in Table 3, mentioned among most of the interviewees presented based on the different attributes.

Table 4 Thematic presentation of result from interviews with 7 entrepreneurs in food related buisinesses in Gulu

	Collective results from interviews based on the six different themes
Diversity	All the interviewees presented a wide diversity in their business in form of: - Different genders, ages, nationalities, and type of employment of the owners and workers - Using different suppliers - Selling the products at several different markets - Reach the market in several different ways
Production	- Most of the interviewees or their suppliers had a constrained access to resources for a sustainable production, especially regarding farming techniques such as irrigation and knowledge about improved agricultural practices - Most of the entrepreneur worked resource efficient, and a few produced a upcycled product - All interviewees mentioned that they faced challenges in the production because of season variations
Learning opportunities	- All entrepreneurs contributed with knowledge regarding their business. The sharing of knowledge occurred in the teaching of employees, suppliers, customers, friends, and surrounding communities. - The shared knowledge concerns environmental impact of food production, nutritional value of food, the agricultural or food processing practices, and knowledge about running a business.
Networks	- All the interviewees gained knowledge, possibilities for coaching and support, and new friends and colleges through the University - All the interviewees gained contact with other entrepreneurs during the Agripreneurship Alliance course - Most of the business are still informal and had no contact with governmental institutions - The exchange of knowledge and the amount of support with other entrepreneurs, collectives, and from family differed between the interviewees.

Resources	- Most of the interviewees had difficulties with a constant supply in their production which brings uncertainty. - Almost all the entrepreneurs lacked storage of raw material. - All the interviewees have a strong social capital in form of family, friends, university, collectives, and neighbours
Enabling enviroment	- All the entrepreneurs faced difficulties with financial support
Other findings	- Several of the entrepreneurs faced challenges with a conservative mindset of people in Uganda that resulted in difficulties bringing a new product to the market - All the entrepreneurs faced challenges with market competition

4.2.1. Observations

During the face-to-face interview with Lucy, I was invited to a farm cooperative village meeting in Paicho, a village close to Gulu. The meeting was held in a sub-county office in the countryside. During the meeting farmers together with professors at Gulu University discussed the value-addition of pork production. I observed how farmers (entrepreneurs) collaborated in cooperatives and together with research institutions. I also gained information about future product development and its contribution to increased income. The project started as result of Lucy's bachelor thesis. She discovered that there is a market for value-added pork products, which opened the eyes of farmers to develop their current production. Now, a project between Gulu University, Ruform, and the farmers with financial support from Mastercard foundation is established. The project has four aims; the use of Indigenous Micro-organisms (IMO) technology, local feed formulation technology, artificial insemination (AI), and pork products processing technology. All for development of a clean, healthy, resource efficient and value-added industry. Some important messages brought from the meeting:

- The project is a perfect example of how to use social networks to increase resilience of the food system
    - Communication in a WhatsApp group, where knowledge and experiences are shared

    - Cooperation in between stakeholders as they plan to invest in shared machines and refrigerators
    - Communication and cooperation regarding risks and innovative solutions
- The potential and feasibility to develop value-added products, more specific: bacon, ribs, sausages, and burgers
- Information about a potential way to cope with unstable prices due to competition:
    - Instead of selling the products at the market where the market decides the prize. There is a value selling the product at home where they can decide the price.
- A great example of a cooperation between research institutions, government institutions, and local farmers bringing benefits to entrepreneur activities

Further, I was invited for lunch at a participant's home. This unexpected event contributed with information about conditions in a household, which helped with understanding prerequisites for food security in Gulu. What are the living standards, the daily routines, and the gender roles in a household in Gulu? I realized the power imbalance between the genders in the household. As a female, I was expected to cook, clean the hands of the males before the meal, and consume my food on the floor together with the children and the wife in the household, while the men did eat by the table. This experience clarified the differences between the genders. Also, the woman explained that the husband is the one deciding over the family. For example, he decides what the wife is allowed to do and how the household spends their food and money. The men are also the ones owning the land by custom. Empowerment of women may contribute to their employment and earnings and enabling women to own their land and decide over their food production. A finding correlating with the literature (FAO 2018).

5. Analysis and discussion

The study aims to investigate how practices of entrepreneurs in Gulu can contribute to positive effects on resilience of the local food system, as well as the main challenges for them doing so. Based on the used framework, six resilience attributes were chosen for analysis: diversity, production, learning opportunities, networks, resources, and governance. In the following sections, each resilience attribute is analysed and discussed one by one.

5.1. Diversity

One of the main capabilities needed to withstand shocks and stresses is diversity. For increased resilience diversity between stakeholders, together within different businesses will contribute to flexibility in the food system. Diversification in a business in terms of gender, nationalities, products, markets, suppliers, and sale channels, contributes to spreading the risks (Meuwissen et al. 2019). As seen in the results, the entrepreneurs ran businesses with a high degree of diversification regarding all mentioned aspects. When counting diversity aspects to get a frequency of each attribute it is important to keep in mind that every business has different needs, and the production differs. For example, Edmund who produced mushrooms showed a lower frequency of diversity compared with Lucy producing fruit juice. An explanation for this is that Edmund producing a food product with limited possibilities for diversification in the production. He explained the importance of buying high-quality mushroom bags because the bags from the first producer he bought from got contaminated. He ensured high-quality in the production by using a trustful producer: Ugandan Industrial Research Institute. Lucy on the other hand is producing fruit juice that contains several different raw materials from several different producers. With that said, Lucy's production can be seen as more resilient compared with Edmund's if looking at the resilience of the business but, when looking at the resilience of the whole system, the most important aspect is that the companies differ from each other and generate diversity in the local food system in Gulu. Many small businesses, each employing a small number of people, sharing profits and creating a variety of food products are perhaps more resilient than a few

large companies or the existing network of informal unstructured providers and small holder farmers.

To ensure food and nutritional security diversity of nutrition inside products as well as between products are crucial. As previous studies shows the food system in Uganda is built on staples (FEWS NET 2022) with limitation in diversity. Therefore, new diversified products are valuable for increased food security. Lucy's juices are a perfect example of innovative products contributing to high nutritional value. The blended fresh fruit juices are a great competitor to single-fruit, highly processed juices, or juices with added sugar, on the market. The reason to this is the higher nutritional content in the fresh juices. During high temperature processes, sensitive, instable, vitamin molecules can easily be degraded. Also, a mixture of different fruits and vegetables increase the diversity of micronutrients such as both vitamins and minerals in the end products, which are important for a healthy juice. Therefore, the unprocessed and blended juices have a higher nutritional value compared with highly processed, single-fruit juices.

5.2. Production

Even if the processing of food products has been the part of the food system in focus, the production of food plays a major role in food product development. The production determines the quality and the availability of the food. For resilience regarding production, there must be resources for implementing sustainable production, different production systems, technologies, and products as well as biodiversity in the whole region (Meuwissen et al. 2019). Most, of the interviewees or their suppliers had restricted access to resources for sustainable production. Beatrice mentions that her supplier lacks knowledge about improved agricultural practices such as water collection methods or mulching and had no access to advanced farming techniques such as irrigation. Likewise, Alfred mentioned difficulties in keeping water for his pigs during dry seasons due to constrained water availability. Worth mentioning is the capability of the entrepreneurs to affect local ecosystems by implementing of practices that can promote resilience. One example is Esther and Helvi, both promoting tree planting to increase biodiversity, keep water in the soil and protect against wind. Both businesses rely upon trees for the primary production of their initial crop. The trees then bring added advantages of carbon sequestration, additional habitat, soil retention and support to water cycle. Another example is Lucy who required organic produced food products and instead of finding producers already producing organically, she taught her suppliers and helped them transform from traditional agriculture practices to organic production.

Hindrances in production due to dry seasons are one of the main challenges identified in this study. Almost all interviewees mentioned that they are facing challenges in their production during dry seasons. No water for the livestock, low quality of fruit and vegetables, and low amount of fruit and vegetables available resulting in higher prices, all challenged the entrepreneurs producing food products which likely impacts food security in the area. This finding is correlating with previous research of food insecurity in Northern Uganda (FEWS NET 2022).

By contrast, two of the entrepreneurs worked directly to decrease food insecurity during dry seasons by preserving fruits and vegetables. Beatrice aims to dry fruit to enable the availability of fruits all year round and therefore also the availability of a food product with high nutritional value. In addition, Lucy is also working with pro-longed shelf lives of food to increase the availability of nutritious products and decrease food waste.

Edmond's production is not affected by the season variation because of the indoor farming technique. The presence of this production system compared with the others shows a variety in the region and contributes to increased resilience. The production of mushrooms requires minimal resources and is very environmentally friendly. The negative aspect of Edmonds' business is their dependency on suppliers from Kampala. The other entrepreneurs buy the majority of their products locally, which both support local people and the local economy see Table 2, as well as shortens transportation. Edmond explained that deliveries were often delayed. During the Covid-19 pandemic, they were not able to get their products at all because of transport restrictions, a problem described in previous research as well (FEWS NET 2022). In addition, long transportation is costly. The current unstable situation in Europe between Ukraine and Russia affects petroleum availability and prices (ibid.), in turn affecting businesses dependent on transportation.

5.3. Learning opportunitets

Learning is an important component of building resilience (Meuwissen et al. 2020) and the attribute was chosen to investigate how entrepreneurs in the food system contributed knowledge to society.

The frequency for each interviewee of practices touching learning was quite low compared with other attributes. This might however be a bit misleading because of difficulties measuring the "amount" of learning and how to calculate the impact. The analysis of the result is based on the number of different stakeholders the entrepreneur directly shared knowledge with. As an outcome of the study, it can be established that the interviewed entrepreneurs all shared knowledge about their

businesses. The stakeholders that the entrepreneurs mentioned that they taught or shared knowledge with during the interviews were family, friends, neighbours, customers, suppliers, and the surrounding community. The type of knowledge differed between the businesses but included knowledge about: food processing, nutritional value, agricultural practices, resource efficiency, innovative unfamiliar products or packages, farming techniques, and marketing, value-addition, and other experiences from running a business.

5.4. Networks

For resilience building in a system, opportunities for collaborations between businesses, other stakeholders, and surrounding institutions (Meuwissen et al. 2019) are important. The networks enable opportunities for trade, share of knowledge, access to agri-businesses products, and stability in the system in terms of risk-sharing and capacity building. The results show that all entrepreneurs have strong networks. The analysis was based on the different types of stakeholders in the food system that the entrepreneurs were collaborating with. All entrepreneurs collaborated with their friends, by supporting each other with knowledge, advertising, or sharing experiences. Edmond explains that he collaborates with another entrepreneur by buying his by-product. The entrepreneur processes cotton and Edmond is buying cotton husks from him for his production. Edward mentioned his collaborations with restaurants. He became aware of the waste from the restaurants and asked them about it. Now he is using the food waste, which he gets for free, as feed for his poultry. The collaboration has mutual benefits for the two parties, and at the same time it contributes to resource efficiency in the food system. In Europe it is not legal to feed animals with food waste from restaurants (Jordbruksverket 2022) and the legality in Uganda can be doubted. But the less regulated food laws in Uganda, may clarify the less relevance of the subject in this situation.

Another example of collaboration between a business and another stakeholder in the food system is Helvi's cooperation with her supplier. Helvi buys shea butter from an old lady, the lady teaches her in processing and production of shea butter from the shea nut. At the same time, Helvi is helping the lady to market her product. She shares her knowledge about value addition, marketing skills and contributes with contacts.

By observation, and when analysing all interviews, the networks were locally based. The strongest links were between the entrepreneurs and friends, family, suppliers, neighbours, and customers. Collaborations with civil society, government, NGOs were not common. Several of the interviewers accounted for

mistrust in the government about fair fees for running a business. Important to note is that only two of the businesses in this study are formal, the others are still informal, non-registered businesses. The informal structure is common across Uganda, but small and medium sized businesses would function as the backbone of a successful economy and a successful food system by unique value proposition which is important for resilience. The areas of production of all the interviewees are common in Gulu but they are all unique in the sense of searching for and aiming for their unique value and how to win market share. They are all aiming to register their business and to up-scale their production and with this process the networks will change.

5.5. Resources

Resources is an important attribute for coping with supply distributions, food availability, and managing risks. Resources can be in form of physical products and keeping a stock of both raw material and product, or natural, social, and human capital that enable reorientation after a collapse (Meuwissen et al. 2019).

Most of the interviewees had difficulties with a constant supply in their production which brings uncertainty. The reasons differed between the businesses. Esther explained she could not access space with the right conditions to store her honey. Edmond mentioned that he had a stock the first year but faced difficulties with the deliveries from Kampala and run out of raw material in the second year. These findings correlates with previous literature about constraints in the food system in Uganda (FEWS NET 2007).

All the interviewees have a strong social capital in form of a social network. On the other hand, field observations and parts of some interviews indicated a power imbalance between men and women which could be attributed to a lack of gender equality. Edward mentions that he employs both men and women but in general more men because husbands' constraints their wives to take care of the household instead of working.

None of the entrepreneurs mentioned any risk prevention initiatives or risk pooling initiatives. Because of the small sizes of the businesses, the human capital is limited, which exposes the businesses to risks, which could also affect the local food system at large. The students interviewed were all knowledgeable about entrepreneurship and agricultural science, knowledge needed to run sustainable agri-businesses. These data must be interpreted with caution because all interviewees studied at university, which is not representative for the whole society. On the other hand, it

reflects the importance of knowledge and education regarding entrepreneurship and agricultural practices for increased resilience within the local food system.

The main risks for the future that the entrepreneurs mentioned by the entrepreneurs were the seasonal variations and fluctuations in prices, which is also described in literature (FEWS NET 2007). Natural capital is available for agri-businesses, but there is a lack of knowledge and equipment to handle the challenges of droughts, wind, and rainfalls. The extreme climate is well described in literature (FEWS NET 2022) as a risk for food security. The unstable markets are a result of the seasonal variations due to lack of availability and quality during dry seasons, as well as lack of storing possibilities, which pushes up prices. Though, to cope with the seasonal variation affecting access to nutritional products during non-harvest season, Beatrice's dried fruits can help, and Edmund's mushroom production is another way to cope with the problem by growing indoor, with minimal water needed. A reasonable approach to tackle this issue could be to put the capacity in education regarding agricultural practices, food processing, but also about entrepreneurship, with particular emphasis on finding the right market and adding value to a product.

5.6. Enabling Environment

The analyse of this attribute was based on available financial support, human capital and knowledge management, and flexibility norms and regulatory frameworks for allowing experimentation and innovation.

The main result for this attribute is that the businesses included in this study are still a bit too small to be able to see the interlinkage with government, legislation, and other institutions. The limited knowledge and cooperation with government in this study's findings correlates with previous literature (GEM 2013). Nonetheless, all of the entrepreneurs pointed out that the financial support available for them is not enough. All interviewees were offered a loan from the university, which they had a positive attitude to. At the same time, they mentioned that this is not enough for the up scaling of their businesses and that loans from the government are way too expensive. A mistrust in loaning money from the government was also brought up. Alfred mentioned his financial support through village savings, and Edward explained that he rather borrows money from friends than from the government. In other words, there are options for financial support without lending money from the government. To enable up-scaling and strengthening of small agribusinesses there is a need for more easily accessible financial support.

5.7. Other results

As result of the study, two topics were identified that do not fit in the chosen framework. The first was the value of uniqueness. To be able to find a place at the highly competitive market and to enable stabilisation of prices, the result of this study shows that value-added products are important. To stabilize prices and to enable entrepreneur reaching the market will contribute to increased resilience of the food system. The attribute correlates with previous literature about Uganda (FEWS NET 2007) but was not found in previous resilience literature. The second topic identified beyond the used framework is the mindset of the local people concerning new innovative products. Most of the entrepreneurs faced challenges in their production with a conservative mindset of consumers. Lucy faced challenges with her blended juices because people wanted one-fruit juices. Esther faced challenges with her honey, both regarding the added flavours and the innovative easy-pourable bottles. She explained that consumers did not want to buy honey with flavour, and neither in innovative bottles. Esther brought the idea from her own home country while Lucy developed her business idea based on the need of nutritional products on the market. The conservative mindset of people brought difficulties in successfully bringing a new product to the market, is not well described in literature and does collide with the value of cultural heritage presented as a social function in society (Van Huylenbroeck et al. 2007).

Another result that could be seen and concluded in the study, is the value of the entrepreneur in the businesses. Several of the entrepreneurs came from other countries and brought experiences from abroad. This brings new ideas and perspectives to the local society, and possibilities to challenges conservative mindsets of people.

6. Conclusions

As a result, it can be concluded that all entrepreneurs in the study generated increased diversity in the region through a diversity of products produced in the business, suppliers, agricultural systems, markets, costumers, sale channels, and background and gender of employees. At the same time all entrepreneurs were drivers of change towards a more sustainable agriculture production by contributing with knowledge for improved agricultural practices and stimulations of different production systems. All the entrepreneurs shared knowledge with different stakeholders, important for the continuously developing capacity of the food system and its resilience. Contributing to services and markets for others, the spread of knowledge, and the share of products, the entrepreneurs contribute to strengthening of networks. Though, the strong social networks were concentrated to friends, university, costumers, neighbours, and other entrepreneurs. Networks with NGO's, government and civil society were limited. The reason is probably the small scale, and informal structure, of most of the business part of this study.

The first research question for this study was to investigate how practices of entrepreneurs in Gulu contribute with positive effects on resilience of the local food system. As answer to the questions, it can be concluded that the entrepreneurs contribute with increased diversity, stimulation of sustainable agricultural production, increased learning and to some extent, strengthening of social networks. The two chosen attributes resources and enabling environment were the two areas with least interaction with the entrepreneurs because of constrains such as limited access to farming techniques, limited access to storage possibilities, and limited access to financial capital. Which leads to the second research question; to clarify the main challenges for entrepreneurs in facilitating resilience in the local food system. The seasonal variations were one of the main challenges for the entrepreneurs. During the dry season the entrepreneurs faced challenges with water supply which affected their production. The limitation in water resulted in lower yields, lower quality of products, and difficulties keeping livestock. In turn, these challenges resulted in fluctuation of prices at the market. During the dry seasons the prices raises a lot. One way to counteract these problems would be to cope with the drought by collecting and storing water during rain seasons, which several farmers need increased knowledge about. Another way to cope with the drought is

to produce during harvest season, and work with raw material stock to enable a constant supply throughout the year. Though, the entrepreneurs do not, yet, do this because of lack of resources such as food development machines and storages possibilities. Another resource that could help facilitating with water-supply despite dry-season is irrigation, and the result showed that access to irrigation is limited because of its cost. All entrepreneurs mentioned they lack financial support to be able to invest and up-scale their business.

The study results contribute to the research gap presented in the beginning by showing how the concrete practices of entrepreneurs in Uganda might stimulate resilience in the local food systems by increasing diversity, stimulating sustainable agriculture production, increasing knowledge in the system but also, the study shows the future potential with entrepreneurs affecting resilience. Even if the entrepreneurs facing challenges contributing to resilience, what can be seen based on the result is that they have the potential to be drivers for future food security. The practices of their businesses can decrease season variations and increase availability and quality of food.

This study is a small contribution to evaluating the need and potential of small businesses for increased food system resilience, more specifically food security. The study highlights the importance of education and increased knowledge regarding agricultural practices and entrepreneurship in the food sector in Uganda. Finally, it should be mentioned that the results and conclusions in this study are based on a small number of respondents in a small area. Therefore, it doesn't represent the whole society but works as an indication of the area motivating future research.

For future research it would be interesting to study similar effects of entrepreneurs on food systems in other areas, both within and outside of Uganda, to perform a similar study on a larger scale, as well as performing a study considering challenges with competition and mindset of people in the resilience analysis.

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7. Popular science summery

To ensure food for all people around the world we must cope with current challenges of today's food system such as extreme weather conditions and instable markets. Food insecurity is a widespread problem around the world especially in many underdeveloped economies, with many countries in Africa affected. Uganda faces food insecurity because of uneven food supply during the year as result of seasons without rain together with lack of storage conditions. Another reason for food insecurity is fluctuation of prizes due to hard competition. The price of a product is decided after bargaining between buyers and sellers on the local market where there are many competitors, and therefore, the prices vary a lot between places and from day to day. Another reason is that staple food is very responsive for price variation because of its dynamic character. If one product increases in price, the demand quickly shifts to an alternative product.

For food security, resilience of food systems is of importance. Resilience is when a (food) system can cope with the challenges it's facing. Either the system must withstand the shocks or recover from them. The aim of the study is to examine if, and if so how, entrepreneurs in Gulu contributing positively to the food system for increased resilience within it. Gulu is a city in Northern Uganda that faced a civil war for 20 years resulted in a food dependency and the area became an extra critical area regarding food security. At the same time the Northern part of Uganda is the driest area in the country and the most critically in terms of agriculture production.

To investigate the role of entrepreneurs in Gulu for increased food system resilience, certain topics were chosen for analysis. The six areas are; learning, production, networks, diversity, resources and enabling environment, all impacting on food system resilience. The study was performed as a case study in Uganda. Seven entrepreneurs were interviewed in Gulu, all students at Gulu University studying the Master programme agri-enterprises development. The case-study setting allowed the researcher to meet the persons in real life, to ask follow-up questions and to experience the culture and the environment in Uganda resulting in better understanding of the topic and the setting. The seven interviewees were all running or had run their own agriculture related businesses. The questions in the study were based on the six areas of investigation.

It can be concluded that the entrepreneurs contribute with increased diversity, stimulation of sustainable agricultural production, increased learning and to some extent, strengthening of social networks. The two chosen attributes resources and enabling environment were the two areas with least interaction with the entrepreneurs because of constrains such as limited access to farming techniques, limited access to storage possibilities, and limited access to financial capital. All entrepreneurs in the study generated increased diversity in the region through a diversity of products produced in the business, suppliers, agricultural systems, markets, costumers, sale channels, and background and gender of employees. At the same time all entrepreneurs were drivers of change towards a more sustainable agriculture production by contributing with knowledge for improved agricultural practices and stimulations of different production systems. All the entrepreneurs shared knowledge with different stakeholders, important for the continuously developing capacity of the food system and its resilience. Though, the strong social networks were concentrated to friends, university, costumers, neighbours, and other entrepreneurs. Networks with NGO's, government and civil society were limited. The reason is probably the small scale, and informal structure, of most of the business part of this study.

Even if the entrepreneurs facing challenges contributing to resilience, what can be seen based on the result is that they have the potential to be drivers for future food security. The practices of their businesses can decrease season variations and increase availability and quality of food. Also, small-scale businesses can contribute employing a small number of people, sharing profits and creating a variety of food products are perhaps more resilient than a few large companies or the existing network of informal unstructured providers and small holder farmers.

This study is a small contribution to evaluating the need and potential of small businesses for increased food system resilience, more specifically food security. The study highlights the importance of education and increased knowledge regarding agricultural practices and entrepreneurship in the food sector in Uganda. Finally, it should be mentioned that the results and conclusions in this study are based on a small number of respondents in a small area. Therefore, it doesn't represent the whole society but works as an indication of the area motivating future research.

8. Appendix 1

Interview questions

Please, tell me about yourself! Who are you?
- What's your name?
- How old are you?
- Where are you from?
- Gender
- What are you passionate about? What do you love?
- Before you did start this business, what did you do?
    - Education?
        - Where did you study?
- I would love to hear more about your family!
    - Is your family involved in your business in any sense?

Please, tell me about your company!
- How many owners do the company have?
- Employees
- Whom/gender/ages/seasonal/informal or formal
- What role do you have in the company?
    - What are the capabilities you need for this? Do you have them? And how did you gain them?
- Legal status of company?

What's make your business unique?
Are this the only work you do have, or is it one among others?
Do you earn sufficient to cover your daily needs on your salary from the company?

Would you please tell me more about your business!
- What different products do you have? (Only one- what product? Several?)
- And who produce these? Whom are your suppliers?
    - Where are these located?
    - Do you use several suppliers?
    - What are they/you producing? What do they produce except this?
        - Who owns the land where the production is located?
    - What certain threats are you/your supplier facing regarding environmental challenges?
        - Soil fertility? Soil degradation? Irrigation water? Pesticides/rescistance?
    - What certain threats are you/your supplier facing regarding social environmental challenges?
        - Gender perspective? Youth → employment?
    - Do you actively work to reduce environmental impacts along your value chain?
        - Supplier? Later – package/choice of products, resource efficient, waste management? Pecticedes/herbicides. Energy. Transports.

Market:
Where are you selling the product?
- At what markets do you sell the products? (Local market, supermarkets, export, web shops..)
- What different sale channels are you using? (Distribution to the market, ex. People, activity…) ex. Website, networking

I'm curious to know more about your collaboration's…
How do your family support you regarding your business?
Do you collaborate with neighbors or costumers? How?

How do you collaborate with other entrepreneurs?

- Exchange products, sharing knowledge, mistakes..

What cooperatives are available for you? Are you a part of any of these?
How does research communities (Uni, AA) help you with your business?
What collaborations do you have with civil society and NGO's?
How do you collaborate with government institutions?

What kind of financial support is available for you regarding your business?

- How do you access financial support?
- And from whom?
    - Family, government, financial institutions?
- Are the subsides and credits enough to help?

How do you work to correct a mistake or a problem in your business? Certain strategy?
How do you contribute with knowledge in your business? Teach/share?

- To employees? Costumers? Suppliers? Are you educating your employees/suppliers?

Do you experience that you have enough education as well as skills and capabilities regarding your business?

- What are the capabilities you need? Do you have them?

What do you see as main risks of your business?

- How do you work with risk assessments? (Any help?)

How do you to cope with potential supply disruptions?

- Do you have any redundant stock?

Future:

If I've understood correctly, this business is a part of your education...
What will happen with the business when you finish your degree?
What are your future plans as an entrepreneur? (similar business or another business somewhere else)
What kind of hindrance do you see regarding developing your company (Short-term vision and long-term-vision)?

- Market and costumers?
- Policies, reforms and support?
- Agricultural and farming conditions?

What kind of possibilities do you see regarding developing your company (short-term vision and long-term-vision)?

- Market and costumers?
- Policies, reforms and support?
- Agricultural and farming conditions?

May I come back to you for questions of clarification if needed?
Would it be possible to get access to your business plan?

Questions placed in framework

Diversity:

Enterprise diversification

How many are you working at the company?

- How many owners are you?
- How many employees do you have?
- Whom are these? Males/Females? Ages?
- What kind of job do they have? Seasonal? Informal/formal?

Whom are your costumers?

What different products do you have?

- Do you have one or several products?

Whom are your suppliers?

Flexibility

Do you use one or several production systems?

Where are you selling the product?

- At what markets are you selling your products?
- What different sale channels are you using?

Diversity of institutions

Which institutions are enabling or helping you regarding your business?

Resources:

Availability and use of *multiple sources of risk management*

What do you see as main risks of your business?

- How do you work with risk assessments?

Redundant stock?

How do you to cope with potential supply disruptions?

- Do you have any redundant stock?

*High levels of natural, social and human capital (*to foster reorientation towards new identity after collapse)

<u>Human capital</u>

Are your family involved in your business in any sense?

What are the capabilities do you need regarding your business?

- Do you have them?
- How did you gain this experience?

<u>Social capital</u>

What kind of collaborations do you have regarding your business?

- Social networks?
- Research institutions?
- Neighbors? Community?
- Other entrepreneurs?
- Civil society? NGO's?
- Government?

<u>Natural capital</u>

Do your suppliers own the land they're using?

Do your producers have properly access to soil fertility?

Do your producers have properly access to irrigation water?

Production:

Resources for implementing sustainable production

What kind of products are your supplier producing?
What kind of production system is your supplier using? (Ex. Agroecology?)
Are you aware of any certain environmental threats your suppliers are facing regarding environmental challenges?

- Or social environmental challenges?
- Or economic challenges?

Heterogenity

Is your business model unique in any sense?

- If so, how?

Do you actively work to reduce environmental impacts along your value chain?

Region diversity and redundancy

Learning:
Incremental innovation – single loop learning
Radical innovation – Double loop learning
Realignment – Triple loop learning

How do you work to correct a mistake or a problem in your business?
Do you as a company contributing with knowledge in your business?

- To employees?
- Costumers?
- Suppliers?
- Are you teaching or share knowledge with your employees/suppliers?

Networks:
Opportunities for collaboration
What kind of collaborations do you have regarding your business?

- Social networks?
- Neighbors? Community?
- Other entrepreneurs?

Stakeholder engagement

- If yes, are you part of any cooperative or organization?

Open attitude to innovation
What is your costumers attitude towards your product?

Governance
Financial support
What kind of financial support is available for you regarding your business?

- What is your perception of this support?

Human capital and knowledge management
What kind of collaborations do you have regarding your business?

- Research institutions?
- Civil society? NGO's?
- Government?

Flexibility