Are SME entrepreneurs in Rwanda green entrepreneurs and how can this be promoted?

A contribution to the MSM-NU conference on the Green economy, theme: 3. Sustainable supply chain management, or Green entrepreneurship and social innovation

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Abstract

Too what extent are entrepreneurs, running small and medium enterprises (SME) in Rwanda green entrepreneurs? On the basis of a survey of 120 SMEs we assess how small entrepreneurs deal with environmental and climate issues in Rwanda. What are the national concerns, reflected in local regulations, which are affecting these businesses?

Using a diagnostic questionnaire, it was found that SMEs in Western Province in Rwanda mention several issues besides environmental and climate issues. The relative importance of these issues is analyzed and different solutions suggested in the discussion with the entrepreneurs are discussed. The data were collected to answer the following questions: What kind of small and medium enterprises (SMEs) can be found in the Western province of Rwanda? Which factors constrain the development of these enterprises?

The activities studied are diverse. Many farmers are not just involved in agricultural production, but also in less conventional activities, such as growing chicken, potatoes or fruits and vegetables for the market. Some also go into trading and processing these products. Processing happens at the local level but requires space and infrastructure. It happens mostly in the formal, sometimes in the informal sector, where enterprises don't comply with the legal framework. We found a large number of supporting activities for SMEs in rural Rwanda. An eco system exists, but environmental and climate change related issues get little attention from the authorities. Their solution requires effective policies and regulations to promote a green environment and sustainable development.

Taking a value chain approach, we note environmental and climate issues in agricultural production (the inputs used), processing (energy use and waste) and the eco-system (increased traffic, energy consumption and waste). Concerning climate change, the quantity of rain and extreme weather events are mentioned as problems. Some activities have severe environmental consequences, like heavy pollution, noise or smell effects and lead to an intensification of traffic flows, but in Rwanda most of these problems have led to regulation, which is sometimes experienced as suffocating by the entrepreneurs.

To achieve green development of SMEs the government should create a more positive policy environment. The survey helped to get an impression of the problems of the SMEs and to formulate recommendations at the enterprise, the local, regional and national level. Rwanda's policies are a combination of state intervention and pro-private sector policies. However, the support for the cooperative sectors has not always been successful and private public partnerships may be a better way to use government support for private sector development.

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Introduction

Small and Medium Enterprises (SMEs) in Western Province in Rwanda face several issues. Based on a survey of 120 entrepreneurs these issues were identified and possible solutions were discussed with the entrepreneurs interviewed. The survey served to answer the following questions:

1. What kind of small and medium enterprises (SMEs) can be found in the Western province of Rwanda and is there an eco-system for these enterprises?
2. Which factors constrain the development of these enterprises and what can be advised to solve the issues and promote their development?
3. To what extent are pollution and climate change issues and what can be done to deal with the issues?

We will answer the research questions and identify to what extent is there a missing middle in the value chains studied (Veldhuizen et al., 2020). Are there SMEs, between the producers of the raw material and the consumers of the final product in Rwanda or abroad (the issue of the missing middle)? Is there an eco-system for enterprises in Rwanda and does this eco system cater for big enterprises only, or is it also useful for SMEs? Finally, what are the policies to promote green entrepreneurship and what are the effects on the sample of enterprises studied?

After describing the research methods and questions some relevant theories are mentioned. Then the data are presented and analyzed. The paper finishes with some conclusions and recommendations.

Methodology

This study uses mixed methods. The paper provides the analysis of a survey of 120 entrepreneurs. Managers of small and medium enterprises were interviewed and the qualitative but also quantitative data were analyzed. To examine to what assess national concerns about the environment and climate change are reflected in local regulations impacting these businesses we used the evidence of the survey: to what extent SME entrepreneurs in Rwanda are green entrepreneurs. We checked the environmental and climate issues mentioned by small and medium size enterprises in Rwanda and what the government is doing about them.

Using a diagnostic questionnaire, the issues which are important for SMEs in Western Province in Rwanda were identified. Besides getting to know the problems of the enterprises we were looking for solutions, based on the diagnosis and discussion with the entrepreneurs. Entrepreneurs often mentioned several issues. The importance of these issues is analyzed and the different solutions suggested are discussed. The data were collected to answer the research questions. It is important to look at the legal status of the enterprise and the legal status of the land used. A number of the enterprises are informal in terms of legal status of their business,

or because they do not pay the legal minimum wage and provide social security to their workers

This may differ from legal ownership to illegal status. For land we distinguished between public and private owned, agricultural and urban land, formal and informal arrangements and legal or illegal occupation of the land (Van Dijk, 2025). There may also be environmental consequences of using a certain piece of land as a SME, like pollution, noise or smell effects and intensive traffic flows.

The SEAD West Project has conducted series of workshops to support SMEs in the Western province of Rwanda. The project focused on farmers, cooperatives and agribusinesses. It also provided a business counselling training programme tailored to individuals with limited working experience with SMEs. The SEAD West project should reach 120 small and medium entrepreneurs in different value chains and give them advise. To achieve this goal this survey was organized. Box 1 gives the major items discussed with the entrepreneurs.

Box 1 **Main questions concerning SMEs in Western province in Rwanda**

Filled in for each interview: activity, gender of the entrepreneur and location. Asked:
Age and education of the entrepreneur?
Accounting system?
Date of starting the company?
Status enterprise: cooperative, incorporated or state owned, formal or informal?
Employment?
Investments?
Turnover?
Income entrepreneur per week?
What do you think of the competition?
Type of accounting system
What are your training needs?
Which problems are you facing?
Which solutions do you see?

Source: based on Warmerdam and Van Dijk (2013a & b).

What does it mean to be a green entrepreneurs in Rwanda? What are the issues and what are the potential solutions? The questionnaire helped to identify issues entrepreneurs are facing and explored possible solutions with them. After listing the problems the SME councilor diagnosed what the deeper problems were and developed some possible solutions together with the entrepreneur interviewed. For the participants in the course on business counseling the question was: do you feel confident in making recommendations on the basis of the interview and your observations of the enterprise? One piece of advice given to the potential business counselors was: try to get back to the company later to find out how the company is doing since you advised them.

To obtain a random sample information from the SME experts of the different districts in Western Province. They know the population of SMEs and were asked to draw a random sample of the addresses to be visited in their district. Since the research works in a value chain

perspective producers of raw material, traders, transport firms, processing units and sellers to consumers, shops or other parties were interviewed. In this way we would not only know the problems of farmers and small entrepreneurs, but also get an impression of the eco, or support system for SMEs and the functioning of value chains that were important for the project.

Theoretical literature

What do we know about medium-size enterprises in Rwanda and how can they policies help farmers and entrepreneurs to boost their green operations? Small and Medium-size enterprises have been the bedrock of agricultural-driven economic progress in Europe. Due to much stronger support or ecosystems and better educated and resourced farmers, European farms have supported a strong agro-processing sector. In Africa the key role such a medium-size sector can play is bridge the gap between large-scale capital-intensive agriculture and resource poor smallholder farmers, who can benefit from the diffusion of modern technologies and agriculture related services and processing activities. SMEs usually have been neglected in Africa, not benefiting from policies or development projects, partially because of the 'missing middle (Veldhuizen et al., 2020).

The literature on SME also suggests to identify factors hindering the functioning of SMEs. In particular institutional economics suggests the analysis of the institutions influencing the functioning of these SME (Reardon and Timmer, 2006). SMEs have specific competencies, which deserve attention. They have market access, assets, such as land, technological know-how, links with other firms and they benefit from the eco-system. SME in the Global South have the resources to interact with both the suppliers of raw material and the consumer markets (Tietenberg and Lewis, 2021) and they play a key role in further developing existing value chains and make them export oriented (Van Dijk and Trienekens, 2014).

Rwanda's green policies are designed to foster a climate-resilient and carbon-neutral economy. The GGCRS, revised to align with the Vision 2050, outlines a development pathway that integrates climate change into all sectors of the economy. Key objectives include:

1. Ensuring energy security and low-carbon energy supply for green industry and services.
2. Promoting sustainable land use and water resource management.
3. Prioritizing social protection, health improvement, and disaster risk reduction.
4. Mobilizing US $2 billion per annum for climate action and nature conservation, with a significant portion coming from government budgets and spending.

The strategy also aims to guide Rwanda's Nationally Determined Contributions (NDCs) to reduce greenhouse gas emissions by 38% by 2030 compared to business as usual. Rwanda's commitment to these policies is reflected in its target to become a climate-resilient and Net Zero economy by 2050: "Rwanda's green policies are a testament to its dedication to sustainable development and its ability to harness innovative financing solutions to achieve its sustainable development goals." The underlying theory is that climate change mitigation requires an energy policy and promotion of sustainable land use.

Rwanda's approach to developing the green economy

To support farmers in their growth new models for agricultural development have been proposed, for example in the Comprehensive Africa Agriculture Development Program (CAADP). This program prescribes how to achieve a rapid six percent agricultural growth rate, with a minimum of ten percent government expenditure used for agriculture. Using the CAADP as the key input, country development strategies have put agriculture at the center as can be seen in many vision documents of African countries (AU, 2014). An unchanging feature of the efforts to achieve agriculture driven transformation of Africa is focusing on smallholder farmers and entrepreneurs. This is understandable given about 80 percent of the farmers are smallholder farmers (FAO, 2012). Meanwhile rising incomes and urbanization are driving diet shifts, resulting in an increase in the demand for processed foods and with that modernize value chains.

Tschirley et al. (2015) found that processed food now holds a 39% share of all food expenditure. These trends are putting pressure on smallholder farming. The demand for processed foods requires a strong agro-processing value chain, which in turn calls for a farm system that can guarantee continuous supply and consistent quality at low prices, which is difficult for many smallholders. Participating in supermarket value chains is a challenge for smallholder farmers and can only be achieved through aggregation. Supermarket orders are huge (as they want to reduce transaction costs) and quality requirements (both health and visual) are also very high. Many smallholders find it difficult to meet these requirements (Reardon and Timmer 2006). As a result, much of the demand is being met by imports, which are huge and rising fast, but go against the idea of assuring national food security with local farmers and agro processing units.

Hence the Rwandan government started to intervene in agriculture and promotes private and cooperative processing. Promotion of the green economy, however, requires different policies and institutions to implement the polices. Rwanda has some Green policies. The publication of the 184 pages strategy called: 'The revised green growth and climate resilience strategy (GGCRS)' by the Ministry of the environment (2023) is an important step in that direction. However, even in this strategy the word enterprises is only used twice when the creation of a Hub for entrepreneurship and Innovation is mentioned and the establishment of an Entrepreneurial support organization (ESO) is announced. It may have been too early to notice in our survey the effects of these policies at the enterprise level.

Weatherspoon et al. (2020) give an overview of agricultural policies in Rwanda, which focuses on efforts to improve infrastructure, supply inputs, achieve land reform, and promote exports, but not on the environment or climate change. They emphasize that land reforms "facilitated the realization of land as a means to finance and secure investments in new agricultural processes". Also, the National Agriculture Policy (NAP) of 2004 and the Strategic plan for agricultural transformation (2005-2024) are mentioned. However, few policies focus specifically on the development of a SME sector which can help the dynamic development of the green entrepreneurship in the rural and urban areas and create employment and entrepreneurial opportunities for educated young people.

There are also regulatory agencies which have an impact on SMEs. In particular the RDB (Rwanda Standards Board; https://www.rsb.gov.rw) and Rwanda Food and Drugs Authority (RDFA; Rwanda FDA) are often mentioned by the entrepreneurs interviewed. The RSB is a government agency that develops and promotes standards, quality testing, metrology and certification in Rwanda. The RDFA was established in 2018. The mandate of the Authority is to protect public health through regulation of human and veterinary medicines, vaccines and other biological products, processed foods, poisons, medicated cosmetics, medical devices, household chemical substances, tobacco and tobacco products. This covers most of the processing activities in our survey.

The criteria are mostly related to public health. Checking the guidelines on words like green, sustainable, environment or energy gives no hits. However, this organisation is very well known to the entrepreneurs, since many were pushed into informality because they did not comply with the rules of the RDFA.

The Rwanda Environment Management Authority (REMA) is responsible for coordinating, supervising, and regulating environmental management for sustainable development in Rwanda. Its main functions include:

1. Implementing government environmental policy and advising on related legislation
2. Conducting inspections and preparing reports on the environmental status in Rwanda
3. Integrating environmental issues and climate change into national development programs.
4. Providing technical support and advice for natural resources management and environmental conservation

REMA could contribute to the development of the green economy, but it is never mentioned by the entrepreneurs in our survey. Its creation is based on a law effective since 2013. Checking the law on the relevant key words (green, environment, sustainable, energy, enterprise, etc.) only the word 'environment' is mentioned 31 times, but mostly in the sense of assessing, managing, safeguarding and inspection, without suggestions how enterprises could become greener.

Analysis of the survey data

What kind of SME can be found in the Western province and is there an eco-system?

Our research aims to unlock the potential of agricultural value chains by examining enterprises in five value chains, from raw materials to consumers and analysing the role of innovation. The activities studied are diverse and not always related, as suggested in the cluster literature (Sultan et al., 2020). Processing happens at a small or large scale, mostly in the formal, sometimes in the informal sector. The technology used is often relatively simple, implying that the negative impact on the environment and climate (their CO_2 emissions) are also limited, depending on the source and quantity of energy used. Table 1 lists the activities in the sample of small enterprises studied. It provides the number of interviews and the average income of the entrepreneur.

Table 1 **The sample of small enterprises studied: activities, number of interviews and average income**

Activity number	Name	Number of interviews	Average income
11	Beekeeping	1	50000
12	Cereal trade	3	172183
13	Chicken farm	1	999
14	Fish farm	4	30666
15	Fruit & vegetables	13	66382
16	Coffee grow/process	5	59375
17	Pig farm	2	50000
18	Potato growing/trade	6	35000
19	Tea production/process	2	77000
20	Timber	1	6000
		38	
21	Bakery	3	31333
22	Juice & wine product	15	106666
23	Food processing	4	5000
24	Milk & milk products	9	55005
25	Maize mills	9	47211
26	Shoemakers	2	40000
27	Taylor	1	12500
28	Butchery	1	50000
29	Wood workers	2	32500
30	Animal feed	3	999
		50	
31	Input sellers	3	20000
32	Telephone kiosk	3	80000
33	Bricks production	1	250000
34	Pharmacy	3	37833
35	Agent banks	3	35166
36	Saccos/MFI/fin.services	4	86000
37	Irembo	3	21000
38	Guesthouse/restaurants	10	37666
39	Sales tools	1	50000
40	Hair dresser	1	75000
		32	

Note calculated for the cases that data were available. 999 indicates missing values

The 120 entrepreneurs interviewed are subdivided into three categories:

1. Production of the raw materials (11-20)
2. Processing activities (21-30)
3. SMEs in the eco-system for agricultural value chains in Rwanda (31-40)

Instead of just growing maize, many farmers are involved in non-conventional activities, such as growing chicken, potatoes or fruit and vegetables in a commercial way. Processing happens and requires land and infrastructure. It happens, mostly in the formal, sometimes in the informal sector. There are a large number of supporting activities for SMEs in rural Rwanda (the eco system).

These production activities (11 till 20) are not very polluting as for the inputs used. Activities like raising chicken, fish farming and cutting trees to make timber do have some environmental consequences. Promoting green entrepreneurship would mean minimizing the environmental effects, introducing the circular economy idea and promoting alternative sources of energy. Yolanda et al. (2026) emphasize the importance of green innovation and technology in supporting the circular economy practices. They also point to the role of the Triple Helix model, also used in the SEAD project (Van Dijk, 2023). For production activities the issue of post-harvest losses deserves more attention. Rotting staple food, fruit and vegetable can lead to pollution and attract certain animals.

Activities 21 till 30 are more polluting and no examples of the circular economy were found. The effects differ from activity to activity and for certain activities the RSB and the RFDA prevent polluting practices through their restrictive rules. Pollution may a play a role in different stages of the production process, which each need their own solution:

1. Transport and storage of the raw materials
2. The production of equipment (not considered in this paper)
3. The use of different types of energy and different inputs in the processing process
4. The treatment of the by-products and waste from production
5. Packaging and storing
6. Transport and sales efforts

Bakeries are often using wood in their ovens and would produce less CO_2 if other sources of energy would be used. Juice and wine production result in a number of by-products, which are usually recycled. Milk and milk products require energy for cooling, transport or cooking and part of the production is thrown away because the humidity and high temperatures may spoil fresh milk rapidly. Maize mills and shoemakers use electric equipment, but their leftovers are usually being used again. Taylors are not very polluting, while butchery results in by-products being thrown away and use energy for cooling. The wood workers use electrical machines (usually manual equipment), while animal feed production results in some waste, which is also generally recyclable. Brick production require clay and can leave behind land which is no longer appropriate for agriculture. Also, small guest houses, restaurants and bars were studied.

Table 1 also shows the SMEs interviewed which are part of the eco-system for the farmers (31-40). There are many supporting activities for SMEs in rural Rwanda. Land market transactions, for example are facilitated by specialized SMEs called ‘Iremo’, which deal with the formalities with the authorities and use modern information technology. Irembo and related land or technology related services allow land to be transferred or equipment to be bought. They use shops, houses or offices, mostly rented.

There are also shops for input supplies, selling everything from seeds to pesticides. They assist with official procedures. We also note a lot of opportunities to get loans. For agricultural production and processing the availability of financial services is very important, just like the presence of dealers selling all kinds of inputs (fertilizer, pesticides, insecticides, etc.) and the kiosks allowing farmers to make phone calls and payments or receive money. Producers need to buy agricultural inputs, medicines for animals and have access to other financial and administrative services. This may allow farmers to obtain information, loans or buy crop insurance. There is a strong relation between the kind of activity and the type of building. In table 2 houses, shops, bakeries, guesthouses, kiosks and factories are mentioned.

Table 2 Economic activities studied in rural Rwanda: land use and the size they occupy

Activity	Type of activity	Land use	Average size in m^2
11	Beekeeping	Agricultural land	500
12	Cereal trade	House/shop/market	483
13	Chicken farm	House	999
14	Fish farm/sales	Land/market	363
15	Fruit & vegetables	Agric. land/market	6500
16	Coffee grow/process	House/factory	345
17	Pig farm	House	5000
18	Potato growing/trade	Agricultural land	1310
19	Tea production	Land/factory	275000
20	Timber	Shop	500
21	Bakery	Bakery	513
22	Juice & wine product	Factory/house/shop	1546
23	Food processing	Factory	5000
24	Milk & milk products	Shop, house, factory	402
25	Maize mills	Factory	2240
26	Shoemakers	Business building	375
27	Taylor	Shop	60
28	Butchery	Shop	999
29	Wood workers	Business building	7
30	Animal feed	Factory/shop	999
31	Input sellers	Shop	425
32	Telephone kiosk	Kiosk	4
33	Bricks production	Agricultural land	2000
34	Pharmacy	Shop	173
35	Agent banks	Shop	50
36	Saccos/MFI/fin.services	Office building/shop	250
37	Irembo	Shop	50
38	Guesthouse/restaurants	Hotel/restaurant/bar	1386
39	Sales tools	Market	50
40	Hairdresser	House	50

It turns out that activities studied are diverse, also concerning the legal status of the firm, their land needs and use. Land owned, rented or occupied is used for animal husbandry, agriculture, building or storage. Three situations can be distinguished:

- farmers involved in growing chicken, potatoes, fruit or vegetables use their farm land, using traditional and often sustainable agricultural practices. However the modern economy is pushing them use more polluting inputs
- starting entrepreneurs beginning at home, or renting a store. In these cases pollution becomes a problem since residuals can not be easily ploughed back in the earth. Investments in sewerage, waste collection and recycling may be necessary
- entrepreneurs using factories. The processing of agricultural products happens, mostly in the formal, sometimes in the informal sector, usually in factories, which require sewer systems, power supply and waste collection at an industrial scale.

There were very few examples of illegal occupation, which is not easy in a very regulated context. The highly regulated environment in which SMEs function in Rwanda discourages investments and makes it more difficult to start an enterprise. The RFDA has pushed many of the entrepreneurs interviewed into informality.

The survey also contains information about the role of finance according to the entrepreneurs interviewed. Many mentioned the need for investment capital or loans. In the eco system we interviewed about ten enterprises involved in land allocation, lending or other financial services. Green or circular production is not a criterion for obtaining a loan.

Which factors constrain development of these enterprises and what can be advised: issues?

Sometimes entrepreneurs complain about the location, which may be too far away from the center of town. The activities of SMEs are often taking place in the formal sector in Rwanda, but may occupy public space, sometimes without permission. Spatial data were collected concerning the location of the enterprise (rural or urban), the type of land use (for agriculture, housing, shop, market, etc.) and the legal status (owner, rented, illegally occupied or provided by the government.

Small and Medium Enterprises (SMEs) in Western Province in Rwanda need land. Some land related issues mentioned by entrepreneurs are the shortage of land (I have no space to expand my business), how can we buy, lease or rent rural or urban land and for our enterprises (is this a formal arrangement? The legality issue), and sometimes the arrangements are informal. Sometimes environmental consequences of using a certain piece of land are mentioned: the activity is polluting, makes noise or there are smell effects. Sometimes the activities have impact on traffic flows.

We also distinguished informal and formal sector activities. Table 2 shows which activities are usually undertaken from home, in a shop or a kiosk. Once machines are necessary, the entrepreneurs often move from a workshop to a factory and the activity will have more impact on the environment. We note that if the land is formal, it is often owned by the entrepreneur interviewed, rather than rented. Shops are often rented.

The major problem mentioned by the entrepreneurs we interviewed using a pre-coded question (only one answer is possible) were financial. The first 40 mentioned financial problems (15), sales issues (12), lack of training (5), the cost of production (4), or location problems (2). They mention that they have financial problems, but the real problem may be a different one: the quality of the product or its design may not be good, the company may not comply with the exiting regulation or has a hard time selling its products. Sales is also a big problem, often related to closed borders with Congo and Uganda, also members of the East African Community (EAC). Other problems mentioned by the entrepreneurs interviewed are listed in table 3 (also only one answer possible and first 70 interviews) other problems are mentioned. The lack of clean water and the floods are environmental problems that deserve attention.

Table 3 Other problems mentioned by the entrepreneurs interviewed: open question

Problems mentioned by the entrepreneurs interviewed		**Problem & frequency**	
1. Competition	2	10. Drought	2
2. Pests & diseases	3	11. No access roads	4
3. Cost of inputs	10	12. Weak internet	5
4. Better seeds	2	13. No export opportunities	4
5. No eco system	2	14. Complicated standards	5
6. Getting the raw materials	8	15. Need better accounting system	4
7. Getting new machines	3	16. Certification	4
8. No clean water	1	Total 28 plus 32 from column 1 total 60	
9 Inundated	1		

Getting enough raw materials is a big problem, and the entrepreneurs complain that often they are too expensive. Table 4 summarizes the type of solutions advised. The recommendations could be one of the options mentioned, or a combination of the options.

Table 4 The type of solutions advised: one, or a combination of the following options

The type of solutions advised could be one, or a combination of the following options (multiple suggestions):	
a. Start more systematic Business planning, prepare a Business Plan	11
b. Bookkeeping, to know your cost and financial obligations	20
c. Quality standards that need to be achieved	37
d. Go for Certification	6
e. Market advice, a marketing study to determine future sales	50
f. Technical upgrading, the equipment used or the level of training of the entrepreneur and his personnel	23
g. Financial support, get a loan using a business plan to convince the banks	24

h. Choose a different location for the activity	26
i. Improve the design of your product	4
j. Others (specify) 'system needs to be worked out'	8

Solutions we recommended, which were not in the list of suggestions, are summarized in table 5.

Table 5 Other solutions recommended

Solutions suggested by the entrepreneurs	
1. More rotation 1	11. Improve storage 1
2. Biological pesticides 2	12. Contract farming 6
3. Better seeds 6	13. Reduce post harvest losses 8
4. Diversify production 26	14. Prepare strategy for cooperatives 20
5. Become member of farmer's forum 4	15. Formalisation of the SME 5
6. Spray pesticide 2	16. Organize access road or relocate 1
7. Buy land 5	17. Promote eco-tourism 2
8. Buy bar, restaurant, building 4	18. Stimulate local economic devel. 1
9. Start processing 13	19. Improve internet 4
10. Introduce irrigation systems 4	20. Improve packaging 5

It can also be noted from the table that the SMEs are there, often cooperatives helped by the government or private enterprises started by dynamic entrepreneurs. The entrepreneurs interviewed do not complain about a lack of processing facilities. Many would like to get into further processing but need an opportunity.

Dealing with environmental issues

Too what extent are SME entrepreneurs in Rwanda green entrepreneurs? We examine environmental and climate issues and found not too many comments. Usually the frustration was about the RSB and RFDA, closing units for all kinds of reasons, also environmental issues. This sometimes pushes the enterprise into the informal sector.

To what extent is environment and climate change an issue and what can be done and advised to deal with these issues as a green entrepreneur? Very few environmental issues were mentioned. However, the following table summarizes environmental and climate issues for the main activities distinguished in the value chains.

Table 6 Environmental and climate issues for the main activities

Type of activity	Environmental issue	Climate issues

Agricultural production	Use of fertilizers, pesticides, insecticides, post-harvest losses, exhaustion of the soil	Lack of rains, volatility of the rains and extreme climate events
Agricultural processing	Energy used, CO_2 emissions, Transport, packaging, noise, waste	Lack of water
Eco-system activities	Energy use, CO_2 emissions, Generating traffic flows, waste,	Extreme climate events

CO_2 emissions,

An example is raising chicken, which is taking place in a densely populated neighborhood. Also reducing post-harvest losses is important since it may also reduce pollution and CO_2 emissions. Improvements of the packaging industry is mentioned very often because in the current situation a lot of modern packaging material has to come from Kenya and other neighboring countries and is considered expensive and requiring foreign exchange.

Dealing with climate change issues

Entrepreneurs mention the lack of rains, more volatility in rain fall and other extreme climate events. However, they don't seem to be aware of their emissions, or possible strategies for climate adaptation.

Is there a missing middle in Rwanda?

Concerning the missing middle, the entrepreneurs interviewed do not complain about the lack of SMEs in the chain. Currently, the cooperative sector seems to play an important role in developing these activities. A different approach has been introduced by the SEAD and SEAD West projects. The project developed Innovation Centers through public-private partnerships between educational institutions and a private firm (Van Dijk, 2023). The ambition is that they become centers of innovation for a dynamic cluster of chain related activities (Sultan et al., 2023).

The presence of many processing units (21 to 30 in table 1) and qualitative information collected during the interviews (there were few complaints that enterprises were missing in the value chain) suggest that there is no missing middle.

Discussion

The survey of entrepreneurs in agricultural value chains in Rwanda shows that the activities are diverse and not always related. Many producers of raw materials are also involved in non-conventional and non-agricultural activities. We used the theory of competencies and the theory of the missing middle and factors affecting the green economy and climate change.

The theory of competencies rightly emphasizes the intelligence of farmers and entrepreneurs to develop their businesses if the incentives are there. At the same time some factors are withholding their development and have been identified.

the theory of the missing middle points to the importance of all kinds of SMEs and eco-services to develop the economy. The active role of the Rwandan government and an emerging cooperative and private formal sector have led to many new operators in the value chains studied, which means that there is no missing middle in this sense in Rwanda.

Climate change mitigation requires an energy policy and promotion of sustainable land use. Here we must conclude that very little has been achieved at the level of the SME and small farmers.

Conclusions

We found that the agro-processing can be small- or large-scale operations and benefit from an ecosystem in Rwanda. Environmental problems are limited in the SME sector, but more positive policies could promote green entrepreneurship.

Taking land issues of SMEs as an example, this is a new theme in the extensive SME literature. The legislation usually focuses on land for housing or agriculture. Industries are supposed to be in industrial zones, and the informal sector is small and gets no support at all. This sector is suffering from the highly regulated context in which they would have to pay all kinds of taxes and comply with a lot of regulations imposed by organizations as the RSB and the RFDA. However, this sector is a source of employment for many poor people and a seed bed for entrepreneurial development, providing cheap products for low-income households

An eco system for SME sexists, but environmental and climate change related issues get little attention by the authorities. Their solution requires effective regulations and an incentive scheme to promote a green environment and sustainable development. There are many supporting activities in the ecosystem, including a large number of financial institutions, but loans are very expensive, reflecting the real cost of lending in an inflationary and developing context.

The diagnostic questionnaire used showed that the problems of the entrepreneurs are different, hence also solutions need to be tailored to the needs of the enterprise. Many activities started or are still cooperatives. However, cooperatives are often not successful and looking for a new role. The questionnaire helped to identify possible solutions for the problems identified by the entrepreneurs themselves.

The analysis shows the importance of the circular economy approach. At the same time many traditional technologies are not very polluting and there is a need for developing innovative green technologies. The SEAD project generated examples, like cheap cages for chicken, simple capping machines for juice bottle companies and the production of animal feed with local products. Packaging is often a problem, because the right material may not be available in Rwanda and needs to imported from neighboring counties.

SMEs require a positive policy environment, a market, technology, land and infrastructure. Land issues get little attention by the authorities. Small and Medium Enterprises (SMEs) in Western Province in Rwanda require land. Land is limited in Rwanda, and entrepreneurs have raised several concerns how to get it (Van Dijk, 2025).

The issue is how to create a positive policy environment for the green development of these SMEs? The questionnaire helped to get an impression of the problems of the SMEs and to formulate recommendations at the enterprise level. There is also a need to formulate recommendations at the policy level. It helped that there is in Rwanda a combination of state intervention and pro-private sector policies of the government. However, it seems that support for the cooperative sectors has not always been successful and an alternative model of private public partnerships (such as developing the Innovation Centers; Van Dijk et al., 2022) may be a better way to use government support for private sector development.

The enterprises may be diverse, but they exist and often managed to develop their business over time. However, many need advice and would benefit from an even more developed eco system. The general policy environment for business is positive in Rwanda, but sometimes too much bureaucracy, too much regulation and loans are very expensive, while environmental and climate issues of SMEs get little attention at the moment.

We conclude that the suggested solutions will address the green issues. The solutions is often a combination of the proposed options. Many times, marketing studies were required and diversification of production has often been advised. Finally, the advice given is to reconsider the rigid standards of the formal sector (the RFDA and RSB), which is often an issue for SMEs in Rwanda.

Recommendations

How to create a positive policy environment for the green development of these SMEs? The questionnaire helped to get an impression of the problems of the SMEs and to formulate recommendations at the enterprise, the local, regional and national level. The circular economy concept deserves more attention and recycling should be encouraged.

There is a need to formulate different recommendations at these policy levels. It helps that there is a combination of state intervention and pro-private sector policies in Rwanda. However, it seems that the important support for the cooperative sectors has not always been successful and private public partnerships (such as developing the Innovation Centers may be a better way to use government support for private sector development. The general policy environment for business is positive in Rwanda, but sometimes there is too much bureaucracy, too much regulation and loans are very expensive for local entrepreneurs.

It is concluded that land allocation in the rural areas is usually less regulated. It is much more an issue in the urban areas. It is recommended to allow SME entrepreneurs to work from home in urban areas and reserve space in low-income neighborhoods to allow enterprise development. Overall, the regulation of public spaces and markets should be designed to accommodate the needs and challenges faced by small and medium-sized enterprises (SMEs).

The solution to the problems mentioned by the entrepreneurs requires effective collaboration for inclusivity and sustainability:

- In urban areas: allow SME entrepreneurs to work from home but formulate clear environmental pre-conditions

- Reserve space in neighborhoods for SMEs, with shared facilities for their waste collection and treatment
- Regulate use of public spaces and markets in SME friendly way, including respect for environmental standards
- Rural areas: usually less regulated, but should be incentivized to use more friendly inputs for the physical environment

Which enterprises have the potential to grow further and how to achieve that. SMEs benefit from a positive macro-economic context. We have several recommendations on the basis of the research:

1. More attention is needed for the interaction between the formal and informal sectors. The informal is an important source of employment and income for poor people. It is often a seedbed for entrepreneurship development
2. Some countries have programs for a gradual formalization of the informal sector (for example Egypt and Tanzania), inspired by the thinking of the Peruvian thinker Henry de Soto
3. Rwanda should develop environmental policies which are inclusive towards informal sector activities and promotes the transition to the formal sector (Van Dijk and Kariuki, 2025)
4. We conclude that support to public private partnerships may be a new way of stimulating private sector development in Rwanda and provided the example of a Service Training and Innovation Center (or STIC). This may be an alternative for the continuing support to a loss-making cooperative sector.
5. The ecosystem for farmers and SMEs is already reasonably developed in Rwanda. By creating the right macro-economic conditions for such systems their development could contribute a more green development of SMEs and the rural areas.

Limitations

No analysis is made yet whether female entrepreneurs have a different look at green entrepreneurship. Also the availability of green technologies in Rwanda has not been studied. The current sample is small and concerns mainly the Western province. No examples of recycling were identified.

Reference

AU (African Union) (2014) The Malabo Declaration on accelerated agricultural growth and transformation for shared prosperity and improved livelihoods. Addis Ababa: African Union Commission.

FAO (2012) Smallholders and Family farmers. Food and Agriculure Organization (FAO), Rome.http://www.fao.org/fileadmin/templates/nr/sustainability_pathways/docs/Factsheet_SMALLHOLDERS.pdf

Ministry of the environment (2023) The revised green growth and climate resilience strategy (GGCRS). Kigali.

Reardon, T. and C.P. Timmer (2006) “Transformation of Markets for Agricultural Output in Developing Countries Since 1950: How Has Thinking Changed?” In Handbook of Agricultural Economics, Volume 3. R. Evenson and P. Pingali (eds). Amsterdam: Elsevier.

Suhail Sultan, M.P. van Dijk and O. Omran (2020) Emergence and development of low-tech clusters: an empirical study of five Palestinian clusters. Emerald EuroMed Journal of Business

Sultan, S. and M.P. van Dijk (2023) Role of promotion policies to stimulate the dynamics and innovation of clusters, the case of Palestine. Chapter 7 in R. El Embrashi, H. Hatlab, R.S. Hassan and N.H. Bouchra (eds, 2023) Industry clusters and innovation in the Arab world. Emerald Publishing Ltd, pp. 205-225.

Tietenberg, T. and L. Lewis (2021) Environmental and natural resource economics. New Jersey: Pearson.

Tschirley, D., T. Reardon, M. Dolislager and J. Snyder (2015) The rise of a middle class in East and Southern Africa: Implications for food system transformation. Journal of International Development. Vol. 27, 628–646.

Van Dijk, M.P. and J. Trienekens (2014) Global value chains. Amsterdam: University Press.

Van Dijk, M.P. (2021) Entrepreneurship in Transition: Lessons for the Technology Start-ups & More. Cochin: Institute of Small Enterprises and Development, ISED Policy Briefs. ISED Small Enterprise Observator, 15 pages.

Van Dijk, M.P. (2023) Triple Helix approach to innovation in Rwanda’s agriculture resulted in a partnership between educational institutions and a private firm producing clean seed potatoes. Journal of Agribusiness in Developing and Emerging Economies.: https://www.emerald.com/insight/2044-0839.htm

Van Dijk, M.P. (2025) Land issues of Small and Medium Enterprises in Western Province in Rwanda, an analysis of a survey leading to recommendations. Ahmedabad: International Land Conference, November.

Van Dijk, M.P., G. Limpens, J. Kariuku, D. de Boer (2021) Telephone farmers and an emerging ecosystem are unlocking the hidden middle of agricultural value chains in Kenya through innovation. Journal of agriculture in emerging and developing countries.

Van Dijk, M.P., Julius Gatune (2025) The Rwanda poultry innovation centre: leveraging the triple helix approach to drive frugal innovations and build a poultry cluster. Anvesak, journal of the Sardar Patel Institute of Economic & Social Research, Vol. 55 (2), pp. 73-89. https://doi.org/10.5281/zenodo.18161049

Veldhuizen, L.J.L., Giller, K.E., Oosterveer, P., Brouwer, I.D., Janssen, S., van Zanten, H.E. and Slingerland, M.A. (2020) “The Missing Middle: connected action on agriculture and nutrition across global, national and local levels to achieve Sustainable Development Goal 2”, Global Food Security, Vol. 24, DOI: 10.1016/j.gfs.2019.100336.

Warmerdam, W. and M. P. van Dijk (2013a) “China-Uganda and the Question of Mutual Benefits,” South African Journal of International Affairs, 20(2): 271-295. DOI 10.1080/10220461.2013.811339

Warmerdam, W. and M. P. van Dijk (2013b) “Chinese State-Owned Enterprise Investments in Uganda: Findings from a Recent Survey of Chinese Firms in Kampala,” Journal of Chinese Political Science, 18(3): 281-301. DOI 10.1007/s11366-013-9250-6

Weatherspoon, D.D., S.R. Miller, F. Niyitanga, L.J. Weatherspoon, J. F Oehmke (2020) Rwanda’s commercialization of smallholder agriculture: implactions for rural food production and household food choices. Journal of agricultural & food industiral organization.

Yolanda Y., R. Yusfiarto, M. S. T. Akza, L. Hamdani (2026) Fostering circular economy in micro, small and medium-sized enterprises: Aligning with the Triple Helix of innovation framework C circular economy, vol. 6 (2), 1-25.