

What role for Green SMEs, Incubator, Accelerator, and microfinance is there in urban climate adaptation in developing countries? A case study from Lebanon.



Source: <https://ied.eu/wp-content/uploads/2018/06/enviroment.png>

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Summary

Climate change and the threat that will be resulted in the future, will leave many urban areas vulnerable, especially the cities in the Sahel, MENA, Central America & South Asia regions (Balsari, Dresser & Leaning, et al.2020; Bailey, et al.2011; Beine, Noy & Parsons, et al.2021). Economies will be directly affected, and countries with economic crises will be the first to feel it. This research, the study will be centered on how Green entrepreneurs in such countries cope with both climate shift events and the socio-economic crisis. Accelerator and incubator programs, providing the right technology, knowledge, and funding programs, structured by developed countries, could aid these green businesses to stay on course, adopting green solutions with a cost/benefit approach. Microfinance could be another way for citizens to cope with the ongoing socioeconomic & environmental crisis(Huybrechs, Bastiaensen & Hecken et.al 2020), the more intense the economic crisis is, the less they will give attention to climate change and its future threat and its products, and this could create further social segregation in the society. Lebanon is currently facing both crises and was studied in an in-depth singular case study for SMEs, accelerator and Incubator programs, and microfinance organizations and interrelation with the ongoing situation. While triangulating from the findings of this research from past academic literature and interviews in the Lebanese case, we have found a positive relationship between green growth and cost/benefit measures. This relationship is caused by the information, knowledge, and expertise exchanged with these SMEs by accelerators and Incubators targeting green growth. As for microfinance organizations' clients, it is not the case, the targeted group is only focusing on the socio-economic crisis, not giving importance to climate change and its future threats.

Keywords: Climate change, Socio-economic crisis, Green SMEs, Incubator, Microfinance.

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1. Introduction

Climate change has been a global threat for the past decades and will be affecting societies of the world in unequal ways, depending on their geographical location (Balsari, Dresser & Leaning, et al.2020), their economic growth, and the way they are able to cope with the costly technological adaptation for climate change (Dercon, et al.2014). He also states that carbon emissions and consumer behavior, caused by the lifestyles of the global north, are the main contributor to this man-made climate change. This unjust climate phenomenon caused by the global north is threatening directly the future of the global south (Raftowicz, et al.2021; Dyer, et al.2014; Goh, et al.2020).

In the coming two decades, developing countries, especially with economic crises, will be affected by this climate change impact in their urban areas (Bailey, et al.2011). This will leave businesses and residents vulnerable to climate threats such as rising sea levels, drought, typhoons, flooding, and high levels of temperatures. Moreover, the citizens in the global south lack financial and knowledge resources to confront the extreme impacts of climate change (Dercon,et al.2014; Goh,et al 2020).

(Long & Rice, et a.2019) and (Caprotti, et al,2014), give several examples of climate injustice. The future does not look bright for humankind especially for the population in the global south, particularly in urban areas. This climate crisis will result in one of the biggest global migrations, health risks, and inequalities, increasing vulnerability that could also lead to escalated situations between neighboring countries (Beine, Noy & Parsons, et al.2021). Climate change will affect primarily countries with economic crises and will even intensify these crises. In these countries, most of the citizens have no access to financing and will tend to find microfinance organizations that are present for people who do not have access to the banking system. Microfinancing is a worldwide concept that gives microloans for poor business owners so that they can expand their business in a sustainable way (Mcguire & Conory, et al.2000). Another type of financial help could be granted from embassies from developed countries, directed to green businesses and startups in poor countries. Such grants could be transferred through local incubators and accelerators programs that could be targeting relevant sectors, helping SMEs grow through their services providing: working space, counseling, coaching, funding, research & development (Lose & Tengeh, et al.2015).

Next, I will talk about the theoretical relevance related to the subject. (Raftowicz, et al.2021) states in her article that uncontrolled globalization is a direct cause of climate change injustice. One example given by (Raftowicz, et al.2021) is dirty industry migration, where developed countries relocate their factories to poor countries with fewer environmental restrictions (less financial expenses due to regulations). By doing so, they are exploiting resources from the emerging countries and creating new job opportunities in the short run, but at the same time limiting the control of vulnerable communities over their environment.

(Dowla, et al.2014) discussed the importance of microfinance in poor countries, to help the population get access to financial resources and insurance. But also discussed the threat of climate change that will impact these clients. (Dercon, et al.2014) emphasized that these poor countries should not put the climate crisis as a priority on the behalf of fighting poverty, favoring brown growth over green growth since Climate resilience and mitigation require a lot of advanced technology that poor urban communities can't afford.

The urban scale combining all of these phenomena creates a heavy burden on poor urban areas. Climate change will hit hard in the coming decades in these particular areas (the Sahel, MENA region, Central America & South Asia) (Balsari, Dresser & Leaning, et al.2020; Beine, Noy & Parsons, et al.2021). (Dercon, et al.2014) states that this will create a counter effect for their economic growth especially if they are also carrying the burden of limiting green growth. In this article, we will be discussing this gap, on how poor citizens and new startups will finance their projects, and how much they can cope with green growth and its expensive implementations, or it could be proven as a cost/benefit alternative to brown growth in the short and long term. The article will be centered on one case study, related to SMEs, incubators and accelerator programs, and microfinance organizations in Lebanon.

Lebanon is passing through one of the worst socio-economic crises that a country has ever faced. Ignited by major protests on the 17th of October 2019, this crisis is the product of over thirty years of political corruption, resulted in civil unrest and the migration of young generations. The migration rate increased by 47.19% and 32.06% respectively for 2019 & 2020 (Macrotrends, 2020). On top of that, the major explosion that struck the capital on the 4th of August 2020, left more than 200 deaths, +5000 injuries, and almost 300,000 homes, industries destroyed. The residents' are calling for a restructuring of the government and public organizations. (Valsamos, Larcher, & Casadei, et al.2021).

Major interventions of Local and International NGOs such as implementing many accelerating and incubation programs, taking precedence over public and governmental organizations is a direct proof of a community that has lost faith in public authorities. (Harb & Fawaz, et al.2021, Fadel, et al.2012)

(Taher, et al.2019), states in her article on climate change and economic growth in Lebanon, written in 2019,that the Lebanese policymakers should emphasize strategies to minimize carbon dioxide emission and deforestation. A recent article written by (Wood & Laurie, et al. 2021), states differently, that Lebanon is under a direct threat of climate change, which will affect its weather and precipitation. Higher temperatures and lack of water will have an impact on the economy, putting a lot of businesses in sectors at risk. They also state that climate adaptation is needed rather than climate mitigation since Lebanon does not initially emit a lot of Greenhouse Gases compared to other countries. They argue for each 1 dollar spent now over 3 dollars will be returned in the future.

A central question for further research would be: how can incubators, accelerators and microfinance help green SMEs in poor urban areas with economic crises adapt to climate change? Such sub-questions could help us understand the correlation of the discussed phenomena:

How can developed societies help poor countries structure and prepare urban areas in this specific field, such as backed accelerators and incubator programs? What are the obstacles? Why should they interfere in that?

Is microfinance and accelerating and incubation programs accessible for all its citizens? Are they adopting or demanding from SMEs owners green growth in poor countries?

Is green growth in poor urban areas with an economic crisis being implemented in the new SMEs and to what extent?

All of these questions will be studied theoretically and observed around a specific case study of SMEs, incubators, and microfinance in Lebanon and its effect on urban areas directly.

This thesis comprises five chapters. Chapter two will be based on the theoretical background of the concepts discussed, then chapter three will describe the method used for collecting the empirical data. Chapter four presents the findings of the 3 targeted groups of interviews. Chapter five will answer and discuss the research question, triangulating from the findings and the theoretical data provided, with future research questions deduced from this study.

2. Theoretical framework

Urban climate Justice is a prominent topic discussed between scholars, politicians, and professionals. After the learning experience coming from the failed sustainable urbanism, developed countries are shifting towards climate urbanism (Long & Rice, et al. 2019). (Caprotti, et al.2014) states that technology could help eco-urbanism and eco-cities in many ways and close many gaps between social classes. But it is not nearly enough and that the crisis is justifying the designed “eco” projects around the world that are not targeting the most vulnerable geographical locations nor vulnerable population against climate change (Long & Rice, et al.2019; Caprotti, et al.2014). On the other hand, green entrepreneurs, incubators, and microfinance organizations in developing countries could address climate change through Innovation in the United Nation’s framework convention on climate change in their TEC Brief #12 (UNFCCC,2018)). In this chapter, I’ll be discussing the importance of green entrepreneurs (2.1.1), Incubators & accelerators (2.1.2), microfinance in developing countries (2.1.3) and finally an overview for climate adaptation and climate economy(2.1.4).

2.1.1 Role of Green Entrepreneurs in Climate adaptation & economic growth

Green start-ups and Small and Medium Enterprises (SMEs) work on reducing Greenhouse gas emissions, improving energy efficiency, and adopting a circular economy (Bank,Fichter & Klofsten, et al.2016). (Surana, Singh & Sagar, et at. 2020) mention the key importance of green innovation and entrepreneurial activity for generating new ways to improve economic development, create new job opportunities while improving the level of delivery of service. They focus a lot on the implementation of the 17 Sustainable Development Goals (SDGs) for the 2030 Agenda in new businesses (UNFCCC,2015). New Green-SMEs play a valuable role in developing climate technologies, but they might face several obstacles: lack of opportunities, environmental potential, limited support...(UNFCCC,2018). In the TEC#12 they mention Gloria Asare Adu, a Ghanaian climate entrepreneur, who turns bamboo into charcoal that burns longer and produces more heat compared to firewood. Her initiative could help preserve forests and cut emissions. Her growth was supported by an incubator: the Ghana Climate Innovative Center funded by the World Bank. This kind of support definitely helps this climate entrepreneurs and many others evolve, shedding light on the role of incubators that will be discussed in the following section.

2.1.2 Business Incubators & accelerators for green entrepreneurs

A Business Incubator (BI), concept that helps new entrepreneurial ideas grow in a healthy and safe environment at an early stage (Hutabarat & Pandin, et al.2013), by providing the start-ups a shared space (with other startups) to work with affordable terms, counseling and workshops: marketing, product development, and fundraisings. They also provide professional management to help the SMEs with fundraising, R&D and procurement. These programs have strict admission and exit rules and usually last between 1 and 5 years (Lose & Tengeh,et al.2015, Bank, Fichter & Klofsten,et al.2016, Ahmad &

Thornberry, et al.2016). (Bank, Fichter & Klofsten, et al.2016, UNFCCC,2018) argues in their article that incubators could specialize in specific sectors. Incubators that focus on incubation programs for green entrepreneurs for example, shed light on the importance of green economy, sustainable growth and decoupling economic growth from environmental pressure. Programs with a targeted topic sector will help Incubators be more resourceful and knowledgeable, creating more opportunities and exposure for their participants. In addition to that, when the manager of the incubation program is more experienced in the given sector or has more entrepreneurial experience, they make participants more satisfied with the incubation service and the program more successful (Ahmad & Thornberry, et al. 2018).

Accelerator programs aim at evolving a successful start-up creation The programs are intensive with a limited duration (Pauwels, et al.2016) of 3 to 6 months, offering mentoring, peer reviews and skills and financial transfer (Mian, Lamine and Fayolle, et al.2016).

(Surana, Singh & Sagar,et al.2020) make a distinction between incubators in industrialized countries and incubators in developing countries. In industrialized countries, Incubators work as a intermediaries who complement other businesses in an already present strong innovative system, expanding the private-sector-driven technology innovation. In developing countries, incubators are the central element of science and technology innovation extending their roles beyond intermediary organizations.

In the TEC brief #12 of the (UNFCCC,2018), the Green Climate Fund and the Climate Technology Center are working closely with Incubators and accelerators to reach their target in effectively supporting climate technology entrepreneurs in developing countries. The 3 main points of this work: a strong entrepreneurial ecosystem, crowding in private finance, new incubation models should be financially sustainable.(UNFCCC,2018)

2.1.3 Microfinance and Green growth for SMEs and start-ups.

Microfinance is a product, filling the market gaps created by banks and state-run development programs that don't take the risk to provide financial services for the poor. Microfinance is the delivery of loans, savings, insurances and other financial services to the poor so they can engage in productive activities (Hammill, Matthew & McCarter,et al.2008). Microfinance can also help with climate change adaptation, helping families be less vulnerable through diversification of assets, and more adaptive to shocks and stresses. Green microfinance and "climate-resilient" microfinance are being introduced in most organizations and guiding clients to apply more climate adaptive measures so they can take advantage of the service (Fenton, Paavola & Tallontine, et al.2015). Microfinance organizations are vulnerable for the events of climate change, (Fenton, Paavola & Tallontine,et al.2015) state that any major climate shock could threaten the sustainability of the organization, giving the example of Bangladesh flooding 1998 that forced most clients to withdraw their savings to cope with the event, depleting the liquidity of the microfinance sector.

Microfinance could help a lot of clients that do not have access to the banking system to turn their business into a more climate-resilient one (Dowla, et al.2018).(Huybrechs, Bastiaensen & Hecken, et al.2019) argues that microfinance could be a tool to make green growth more efficient through incentives, ideas and motivations, depending on the potential of funders and have a paradigm shift in their development path.

2.1.4 Overview for climate adaptation for Green SMEs and climate economy

The shift to a climate economy could be a costly one (Bailey, et al.2011), requiring advanced technology, and creating a global assemblage of interurban investments. New interurban networks groups, research-oriented groups, and investment-oriented agencies like the World Bank could be such investments (Long & Rice, et al. 2019).

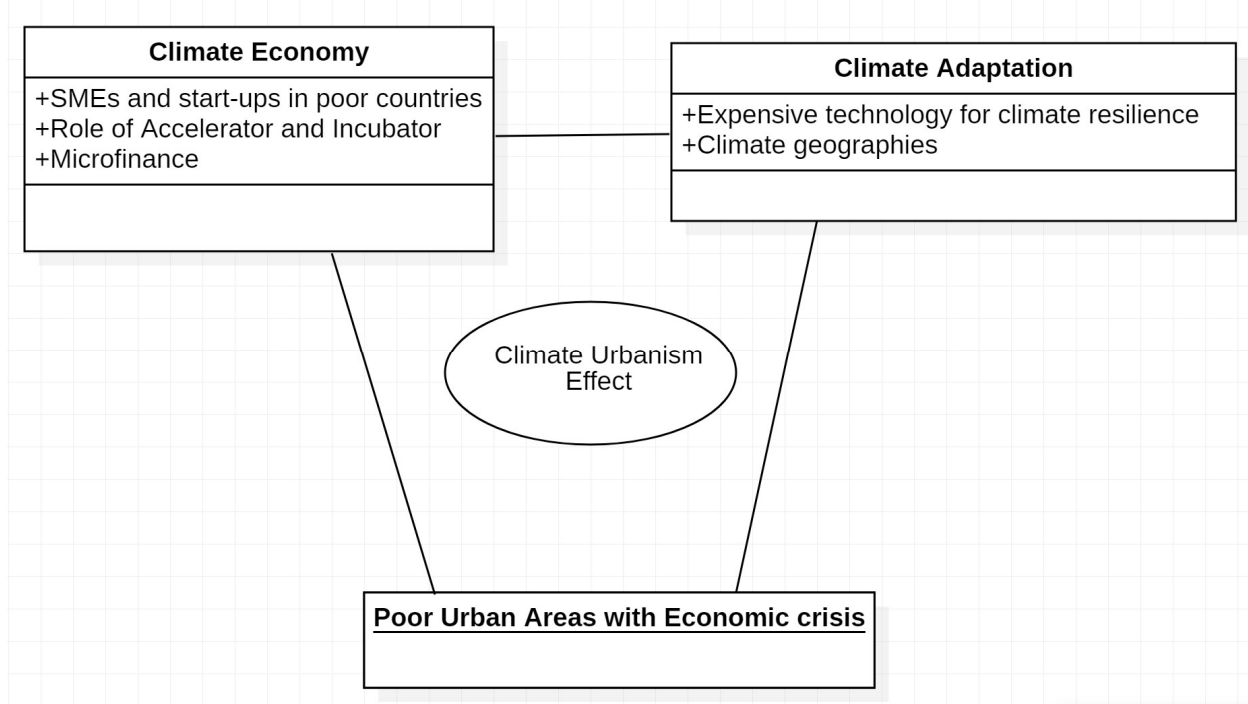
(Dercon,et al.2014) discusses the case of 50 poor countries and the economic adaptation towards climate change. He argues that their GHG emissions are very low compared to other countries, and their contribution to climate change is low. He also stressed that Green growth for entrepreneurs shouldn't stand in the way of economic growth, and shouldn't be prioritized over poverty. Future wealth and prosperity in these countries will help them adapt to the effects of climate change. He suggests that allowing those countries to adopt brown growth in the short run will help them fight poverty, and they will be able to afford the technological requirements (long & Rice, et al.2019; Goh, et al 2020) to fight climate change. SMEs adopting brown growth in poor countries could stabilize their economic growth and afford climate adaptation measures in the future (Dercon, et al. 2014; Dowla, et al. 2017)

The developed North is adopting most of the urban climate-resilient projects because of its powerful position (Goh, et al.2020) and its technological advancement. This will leave a big gap between other countries when it comes to climate urbanism. (Long & Rice, et al. 2019) state that Technology is the "panacea of climate urbanism" making it hard for countries facing poverty to transform their urban areas into climate-resilient ones. A statement that is also backed by (Dercon, et al.2014) favors brown growth and poverty over green growth for businesses in poor countries.

2.2 Conceptual model

In this conceptual model, we are trying to find the gap and relation between climate adaptation and climate economy, in countries with economic crises.

In the **climate economy**, the research will mainly focus on the role of green SMEs, Incubators and accelerators programs and microfinance in poor urban areas, taking into consideration **climate adaptation**. Both climate terms will be discussed in the context of a country passing through an economic crisis taking into consideration climate change.



2.3 Hypotheses

Proposed hypotheses could help solve the urban climate adaptation crisis for Green entrepreneurs in poor countries:

- Prioritizing poverty in urban areas over climate change, or at least finding an equilibrium between the two in green SMEs.
- Finding green solutions with a cost/benefit approach.
- Adopting green growth as an investment for the future.
- Incubators and Accelerator programs creating a safe environment for new Green SMEs.
- Limited capacity of microfinance organizations in the face of climate adaptation and poverty.

All of these hypotheses will be analyzed through the case study, academic literature, and governmental numbers in the Lebanese case study.

3. Methodology

The method used is an in-depth case study approach that relied mainly on qualitative interviews with different Green start-ups and SMEs, incubator programs, and 1 microfinance organization. The participants are based in urban areas and their scope of work is around clean energy, microfinance, technology, and specialized incubators and accelerators (clean energy, and Agritech). The interviews will help the researcher have a close grasp of the current Lebanese situation, on how organizations, programs, and businesses are all adapting to the socio-economic and climatic situation.

6 green SMEs were interviewed: 3 of which work on waste collection, one creates products out of recycled plastics, one produces clothes out of recycled materials and the last SME is a consulting firm working on solid waste management for municipalities. In terms of incubators and accelerators programs, 3 programs were interviewed. The programs are backed by the French, Dutch, and US Embassies. A microfinance organization was also interviewed to gather more information.

Respondent #	Entity	Type of work/ name of the program
Respondent 1	SME 1	Solid waste management organization
Respondent 2	SME 2	Solid waste management organization
Respondent 3	SME 3	Solid waste management organization
Respondent 4	SME 4	Plastic Recycling startup
Respondent 5	SME 5	Recycled cloth Fabric startup
Respondent 6	SME 6	Municipal solid waste consultant startup
Respondent 7	Incubator 1	Cleanergy - BERYTECH
Respondent 8	Incubator 2	Agritech - BERYTECH
Respondent 9	Incubator 3	Omdi Program - Makesense
Respondent 10	Microfinance	Al Majmouaa

Table 1: Interviews conducted by the Author

Interviews were conducted individually in the first 2 weeks of November 2021, either online or physically depending on the location of the interviewee and the Covid-19 situation. No major problems were encountered. The interviewees seemed knowledgeable about the topic and offered some valuable insights, giving examples of their daily practices in their activities.

Other sources of data used are extracted from:

Reports from United Nations: UNFCCC,2018 Tec brief #12 and UNFCCC,2015 The Paris Agreement

		Articles themes				
Authors and Date	Green SMEs and startups	Business Incubators and Accelerators	Microfinance Organizations	Case Study: Lebanese Situation	Climate Change effect on the economy	Climate Change and climate justice
	Bank, Fichter & Kolfsten, 2016	Bank, Fichter & Kolfsten, 2016	UNFCCC, 2018	El- Fadel, 2012	Stefan Decron, 2014	Dyer, 2014
	Lose & Tengeh, 2015	Ahmad & Thornberry, 2018	Hammill, Matthew and McCarter, 2008	Harb & Fawaz, 2021	Lose & Tengeh, 2015	Bailey, 2011
	Hutabarat & Pandin, 2013	Lose & Tengeh, 2015	Dowla, 2014	Taher, 2019	Dowla, 2014	Goh, 2020
	UNFCCC, 2018	Hutabarat & Pandin, 2013	Huybrechs, Bastiaensen & Hecken, 2019	Valsamos, Larc her & Casadei, 2021	Raftowicz, 2021	Balsari, Dresser & Leaning, 2020
		Mian, Lamine and Fayolle, et al. 2016	Fenton, Paavola & Tallontine, et al. 2015	Lawrie and Wood, 2021	Long & Rice, 2019	Robin, 2021
		Surana, Singh & Sagar, 2020				
		Pauwels, et al. 2016				

Table 2: Articles used during the research per category

A friendly approach helped get sensitive and critical information. Well-structured questions with indicators for the answers during the assessment of the interview were taken. After consent, the interviews were all recorded. The interviewees had no problem in sharing sensitive information related to the topic and their daily struggles, caused by either climate change or the socio-economic crisis.

After collecting all of this data, an assessment and triangulation of data was made, which helped deduce how different SMEs are working in the current situation, with regards to the economic and social crisis. It also showed the climate threat to their business and the level of commitment of adopting a green business rather than a brown one.

4. Results

4.1 Case Study businesses in Lebanon: Climate change, stability, and growth

The research targeted 3 groups, only one of which will be studied intensively. The main group is based on 6 different SMEs of green entrepreneurs who were chosen for their knowledge of climate change and its threats. All respondents have stated that they participated in incubation and acceleration programs, related to either social or environmental impact or both. The series of questions gave us some insights into how the SMEs are reacting to climate change, the socio-economic crisis, and the threat that might come from climate change. The incubation programs they took part in were all backed by developed countries such as the Netherlands, France, and the US, giving their projects some technical knowledge and funding.

The two remaining groups were 3 incubator/accelerators that are backed by developed countries. All of the SMEs took part in at least one of the 3 programs that were targeting social, economic, and environmental impact. Some of the programs took the 3 aspects into consideration which can be a bit tricky for participating people and entities. Finally, the third group belongs to the only microfinance organization in the country, showcasing very different findings than the other interviews, by targeting different audiences and their perspectives on the current situation.

4.2 In the lens of Small and medium enterprises.

The green versus brown growth debate between SMEs in Lebanon is creating some confusion on how to proceed with their growth. Lebanon has a small market, and few green players at the moment. Some green coalitions are emerging such as the Ecoswitch festival that took place in November 2021, gathering more than 80 eco-entrepreneurs. These workshops transfer knowledge and enable the exchange of experience, especially in the complicated situation of the socio-economic crisis. This crisis is emphasized by the shortage of financial resources, government infrastructure, fuel crisis, lack of security and stability caused by internal corruption, and regional geopolitics. This will create many obstacles for these eco businesses, on top of the climate change challenge that sometimes kills the financial competitive advantage. The 6 interviews conducted covered questions related to the adaptations that were made to keep businesses alive, and how these can compromise their green approach. Findings were diverse and positively surprising, showing the consistency of these businesses to keep up with this green course as much as they could.

4.2.1 Businesses and the green shift

Climate change is a global threat, and a lot of businesses are taking a green approach, either from global policies or from personal incentives. The first question to this group of interviews was related to the shift to green growth and the emergence of eco-entrepreneurs in the market as a vital game-changer. Then, the need of changing their business model structures and adapting them to climate change was discussed.

The SMEs respondents identified themselves as green businesses tackling environmental aspects that could help fight climate change. Adaptation is taking different measures between businesses. Respondent 5 stated that their innovative machines emit less carbon compared to similar ones; and that their business internally is taking a sustainable form of doing things, focusing on the ethical part, working environment, and factory infrastructure alongside the carbon footprint. Others didn't see their green business needing to adapt to climate change for now, but mainly for the socio-economic crisis and the blast of August 2020 that forced them to find new ways of transportation (fuel crisis) and new sources of energy (power shortage) by shifting to electric bikes in their urban waste collection and acquiring solar panels to replace public power shortage (Respondent 1&2). They claimed that they are not "greenwashing": their first approach was always a green one, and at the same time they had some economic advantage in doing so. Pluvial flooding in one of the businesses made them rethink their whole operation, by either adapting or relocating, even if they never realized that this event would be a product of climate change. Respondents 3,4 & 6 stressed the shift to green growth and mentioned that adopting the circular economy in a more sustainable approach would induce this pattern to have a reinforcing relationship.

4.2.2 The world of incubators and accelerators

The interviewed SMEs were part of incubator programs provided by local and international institutions and backed by developed countries. Incubators sometimes require criteria such as clean energy programs or social impacts. Applicants shared their experience of their respective growth with the help offered. Incubators and accelerators, supported by developed countries, could help their applicants adapt, mitigate and make their business model more resilient in the face of climate change.

Respondent 6 didn't have any experience or knowledge related to climate change or its threat from any of the incubation programs. They only focused on the business side of the enterprise, even though they are adopting green growth. Two Initiatives claimed that there were some criteria that weren't mandatory, but felt the necessity to integrate green growth with the project programs. Climate change wasn't a priority, but they did have some workshops related to carbon emissions and optimizing their work using "green technology". They didn't have any workshops related to the climate threat and didn't think that it was a prominent issue at the moment. They both agree that programs are backing green businesses and mainly green growth since they were supported by developed countries. Respondent 6 added that grantor and funder have certain criteria centered on the environment, economy, and sometimes gender equality. So there are different aspects to be considered at the same time. The more effort is put into those, the more credible are the results. Even with the economic crisis, opportunities for environmental impact are really abundant. At the same time, since they are still in their ideation phase they are not really focusing on these criteria, but instead on the business model, especially with the ongoing socio-economic crisis. Hence, little knowledge was shared on the climate threat to their model. Respondent 2, who has been participating in programs for the past 5 years, stated that the first 3 programs focused mainly on the business and revenues, but recently climate change is more embedded in the programs. The *impact rise* program, which is a green-themed incubator program, is making them evaluate their old business model, applying green business model and business plan, and eco-design tools. But there is still very little knowledge and information exchange on future climate threats to their business. The oldest organization (respondent 3), established in 1985, stated that grants are not only focused on climate change but also based on the local needs. So the focus is diverse, such as the

economic crisis, power shortage, the August blast. Sustainability wasn't a priority in terms of grants recently. Nonetheless, they and other SMEs are trying to integrate it stating:

"I think that in the future beyond this multi-layered crisis, grants will definitely have to integrate green growth and green sustainability. Also, something to be mentioned, since the covid outbreak, programs are more and more assisted by the project donor, so they can monitor the work more closely, for climate change or others. In the past, it was less strict and we had more freedom in the allocation of budgets. Since the grants are more directed to green growth, somehow you can say that yes things are going to be more green in the future because of that close follow-up. Assistance in equipment, consultants, financial follow-up and so forth...This resulted from past experiences that made the donor less trusting to some projects in Lebanon, in terms of money allocation."

Incubator programs could have different ranges and it could be an explanation why the most experienced SME have a different approach and perspective to the allocation of funds. This is because they are already established, and their projects are implemented on a bigger scale. They work closely with donors on the society's needs, which in the Lebanese context is related primarily to poverty, socio-economic crisis, and the effect of the Beirut blast. The main focus is social impact, prior to the environmental impact. All other organizations have almost the same scalability and are somehow experiencing the same pattern depending on their progress level and need a green business model with grants allocated under that category.

4.2.3 Future threat, adaptation, and loans

Climate change could be a major threat to business in urban areas as previously discussed, could play a major role in economic growth. The expensive technology for mitigating and adapting to threats could leave a lot of businesses in countries with economic crises vulnerable. This could affect and disrupt business growth on top of the economic crisis. Identification of this climate threat could help entrepreneurs in such situations adjust accordingly and avoid unpredicted climate damages. These damages could affect SMEs default in paying their loans, if they have any, since the banking in countries with economic crises could not provide such services. Businesses could shut down, not being able to cope with the ongoing layers of problems.

Assessment for the threat of climate change in the future is blurry in the eyes of green entrepreneurs. Most of them stated that it is not their biggest concern, especially in the presence of the socio-economic crisis. Some suggested that they won't think about it at the moment, but probably they will in the future when the time is right, stressing the current instability in the country. Most SMEs don't have enough knowledge and information about the threat, which eliminates the option of having a climate change adaptation plan. The most experienced organization stated that nothing is well established at the moment, and R&Ds are being done in order to set this plan. Respondent 5, a SME manager, stated that: *"In Lebanon, because of the situation, we have a lack of data, our organization is trying to find this data."*

Respondent 6 didn't share the same plan, because of the nature of their work, stating that their business is targeting the ecological footprint, so their work is including climate change and its products, its effects could be one of them.

Only one respondent mentioned that they are not considering the threat of climate change in the future. Others were considering it but using different approaches such as:

- Relocating to a new sustainable location, taking into consideration all of the aspects such as flooding, greeneries, solar panels, suitable workspace...
- Acquiring upgraded insurance including natural hazards of climate change
- Advanced awareness of the younger generation on climate change, and that new businesses will have more green solutions in the face of this threat.

The more experienced organization stressed again on the lack of data and a common structure plan for all organizations. To address this, intensive research and development should be taken jointly between all stakeholders.

Respondent 6 argued that, to succeed in their mission, they need to adapt to climate change and its threat. They need to understand the challenges and to reiterate their business in order to better cater to the needs for solid waste management. They are looking to integrate all of this into the circular economy principles.

What all SMEs have in common is that the socio-economic crisis is the sole reason why they are postponing that shift, and mentioned that if they were in a stable country, they would have acted differently.

Finally, in terms of loans, only respondent 2 mentioned that they took personal loans from banks and used them for their project, and another loan from a foundation that is backing young green entrepreneurs and that won't be paid in the near future. The money that is being raised at the moment will be used for the expansion of the organization. Other respondents mentioned that getting a loan from the bank at the moment is impossible, and they don't know whether it is a good thing or not, considering the lack of trust in the financial system as a whole in the country. At the same time, they would welcome any sort of financing that could help them expand their operations. Respondent 1 stated:

"It's not that we don't want to take a loan, we don't mind taking out a loan to expand because we believe our business is sustainable."

All initiatives agreed that any climate hazard would make them default on the loan and added other encountered problems, such as the power shortage that could alter the production and cause financial losses.

Respondent 6, the manager of an SME whose financial model is based on contracts with municipalities stated:

"Things are really tough and people are finding it hard to put food on the table. That goes as well for municipalities in terms of financials. So it will be hard to adapt."

4.3 In the lens of Accelerators and Incubators

In the lens of accelerating programs related to businesses and social enterprises, a shift in the final product is happening, based on the SDGs set by the United Nations (UNFCCC,2018,Surana, Singh &

Sagar, et al. 2020). Programs interviewed are more diverse and specific at the same time. For example, Agritech is an incubator that focuses on water energy for food. Another incubator program called Cleanergy, focuses on renewable energy, solid waste management, and green innovation businesses.

Omdi program focuses not only on green growth but also on social impact and follows closely the changes that are happening at the national level. Cleanergy's manager program shared that they see this shift toward green growth, and the financial crisis that's currently happening in Lebanon is surprisingly driving further towards clean energy because of high fuel prices .

Most programs focus on climate education in terms of adaptation and mitigation. During the interview, respondent 7 a program manager stated:

“Yes, So, we do focus on specific areas within climate education... areas that the companies and SMEs are tackling. So for example, if they, we are working on cleantech. We don't focus on Wastewater management. We focus on Transportation energy reduction. So we do take aspects of climate change. We break it down into smaller more manageable aspects to focus on, and we work on that.”

Only one manager, respondent 9 gives the liberty toward green application since they are more focused on the social impact. But at the same time, they mentioned that many entrepreneurs don't know how to allocate their financials or how to spend their grants according to their business growth. All of the programs didn't set any strict conditions on the funds and gave liberty in the spending because of the current crisis.

So far no major events related to urban climate hazards with businesses. Only minor floods were mentioned. In terms of future programs related to the climate threat, there is nothing concrete yet, but things are getting more serious around this topic. Respondent 7 expressed on the future with climate change:

“That eventually, yes, businesses will struggle because the solutions that are currently available do cost money. So it's either that they will go to more, low-tech solutions, or they will need to get more creative. Now, if we're talking from now till probably after five years, they could be okay, maybe five to ten years. This is where I think the actual struggles will happen”

Finally, after asking about tackling the economic crisis or climate crisis the answer came: for both equally, since participants join with a strong passion for clean energy, and others have this as a by-product, but their primary focus is on the green aspect. It is also mentioned that continuing with brown growth is not proven sustainable even within the economic crisis. Respondent 7 stated:

“Weirdly, this crisis is reinforcing green solutions simply from a mere cost/benefit. People are not looking for green solutions but for cost perspectives that happen to be environmentally friendly. “

This scheme is not applicable to all sectors and some are continuing with a brown growth, giving the economic crisis a priority.

4.4 In the lens of a microfinance organization

As discussed in the literature, microfinance is a financial organization that gives microloans to individuals that don't have access to the banking system. Only one known microfinance organization in Lebanon

took part in this survey. The clients and beneficiaries of this service come from different backgrounds than entrepreneurs applying for Incubator programs backed by developed countries, which is proven by the data gathering. The interview mentioned that first of all, the clients to this financial service don't have on their radar consideration to climate adaptation. It is not an issue here: because of the socio-economic crisis, climate change is not a top priority for many of their clients. If things were different they might have different answers, but the current beneficiary priorities are *"sheer survival in front of the onslaught of the financial situation."*, shared the respondent 10.

Secondly, climate change is not targeted by this organization: they just don't fund projects that destroy the environment or the social fabric. Climate change is taken into consideration by giving general sessions about environmental impact.

Thirdly, loans were not repaid because of the economic crisis and not because of climate hazards in urban areas. Only in rural areas, the agriculture sector led to the inability of paying back the microloan.

Respondent 10, who is the manager of the organization, agreed with previous groups of interviews that they are ill-equipped and ill-adapted to so many things by stating:

"Climate change is not even the least of which, But Yes. I have every reason to suspect that in the future, this is going to become a larger and larger issue that I don't think we're either prepared for or at least aware of what needs to be done to mitigate the consequences."

Finally, on the adoption of climate solutions, the interviewee stressed that the focus is so much on survival that climate and environment awareness would be really hard to incorporate into any program. He agreed with other interviews that in the midst of a severe power crisis in the country, many businesses are considering moving into solar panels, but don't think it will be addressed to his group of beneficiaries since it remains an expensive technological solution. The rate of adoption of solar among their clients is extremely low.

5.0 Conclusions, discussions, and future considerations

SMEs and microfinance beneficiaries in countries with economic crises will struggle in the future because of the economic threat or the environmental challenge that needs costly technological investments (Long & Rice, et al. 2019, Dercon, et al.2014, Robin, et al.2021). In this research we have investigated several green SMEs in this situation and discovered different patterns under one common objective: sustain green growth. Some SMEs are taking some measures in the path of brown growth until the country has healed from its economic crisis as (Dercon, et al. 2014 & Dowla, et al. 2017) all stated in their articles. Some others, with the help of grantors, incubators and funded accelerators from developed countries, are trying to find environmentally friendly solutions with a cost-benefit approach as (Robin, et al.2021, UNFCCC,2018, Lose & Tenge, 2015) argue in their articles on the reinforcing relationship. (Robin, et al.2021) gives the solar panels example that was found to be true with many of the interviewed initiatives.

Incubation programs and their approach with new SMEs, could direct them, and help them build their green businesses in a safe environment through grants and counseling, regardless of the current socio-economic crisis (UNFCCC,2018, Bank, Fichter & Kolfsten, 2016). They also state that programs should adopt a more sustainable course with their clients, that was also found with the interviewed SMEs.

This targeted SMEs and the incubation programs behind them have under their radars the climate change adaptation for the future, but at the moment part of their energy is directed to the socio-economic crisis.

In terms of beneficiaries of microfinance, the targeted group of small business owners is far from taking this matter into consideration, or even adopting a green business. Their biggest and only concern is to cover their daily basic needs. This is creating further segregation in the society that would reflect badly on an economic, social, and environmental scale, shaping the new reality of urban areas. Beirut and other cities in Lebanon are known for their historical richness and beauty, which could be affected by this shift.

From the pool interviews, with the absence of one common structured method for green SMEs, we can see a wide range of solutions in Lebanon, either adopting a green growth, brown growth, or cost/benefit approach, an issue that the UNFCCC is trying to reverse.

In this study only green entrepreneurs were interviewed which helped us gather more information on the topic. For a more general view on the situation, maybe a comparative study with other types of businesses would come in hand, for the future adaptation of climate change to their businesses. That would also be the case for a group of people having a microloan and their input on climate change.

One can argue that a lot of people from climatic vulnerable areas will migrate to safer lands such as Lebanon (Balsari, Dresser & Leaning, et al.2020; Beine, Noy & Parsons, et al.2021). At the same time, more than 200,000 young Lebanese have emigrated from the country in the past 2 years (Macrotrends, 2020) which is around 4% of the total population. The overlapping of the two migrations could lead to a complete shift of identity in the country, which scholars can investigate more in the future.

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Appendices

Appendix 1: Interview guide with Small and medium enterprises

Respondent:	
Date:	

Thank you for taking the time to talk to me. This interview will last about 20 minutes.

Your answers will help us with our research. I am a student at the University of Groningen and conduct research into how countries with economic crises help business owners in urban areas adapt to the future threat of climate change. I'll be asking you questions on how your business is running during this economic crisis, especially for people living in urban areas. Firstly I'll ask about the selection criteria and requirements for the grant/loan that you applied for, secondly will be around the information exchange through the program, then I'll be asking if the program helped you put climate change adaptation as a priority in your business models, and if you are eligible for this financing scheme are adapting any climate change mitigations, adaptation, and resilience. Then I will ask if there is a follow up with the incubator at the level of your commitment towards that new adaptation after the completion of the program. Is this growth in a poor economy favorable for your business or you are not being able to have a competitive advantage? Finally, I would like to know more about the program sponsor coming from developed countries' embassies and their regulations and if they gave you any technical or networking assistance.

Disclaimer: Is it alright if I record the interview so that I can make a transcript?

+++

Introductory questions

In recent years, we have been confronted with more extreme weather conditions, and these are expected to aggravate in the future. Examples are increases in rainfall, heat waves, or drought. Climate change could affect primarily small business owners that have little means to adapt to urban areas.

1 How can you relate to this shift in new startups and initiatives? Did you experience a need in the way you want to run your business?

- a. Does your organization adopt a green sustainable business?
- b. Does the market for financing small and medium businesses have a significant shift for the green growth approach? Or is it irrelevant and green growth is not one of the criteria?

2 Does your incubator have specific requirements related to climate change to your business?

→ Does your organization have an assessment on the threat of climate change in your work

If yes:

How are you planning to mitigate, innovate and adapt to this climate shift in urban areas?

If no:

Is your business ready to have workshops related to climate change mitigation and adaptation in the future?

3 How are you paying your loans, and are there any type of loans that are not being paid?

- a. **Do you face problems with paying their loans?**

- b. **Did you encounter problems in debt payments caused by climate change hazards? Flooding, drought...?**

4 Do you think your business in the future will struggle during climate change hazards and lack of mitigation and adaptation?

Concluding

1. If we have any clarification or new questions that can be deducted from the interview to ask them.
2. Repeat the agreements made at the start [As was stated in the consent form you signed, the recording of this interview and the information deducted from this it will be used solely for the purpose of this research and will only be accessible to our research group and our supervisor]
3. Summarize the most important points.
4. Is there anything that you would like to ask me or any last points you would like to add?
5. If you have any questions or concerns you can contact me at any time.
6. Thank you again for your time and for allowing us to interview you.

Disclaimer: Interviews might be subject to change depending on the person or organization, especially for the mitigation part if it is feasible in that case.

Appendix 2: [INTERVIEW GUIDE] For Accelerator and Incubator programs for new Green SMEs and startups.

Respondent:	
Date:	

Thank you for taking the time to talk to me. This interview will last about 20 minutes.

Your answers will help us with our research. I am a student at the University of Groningen and conduct research into how countries with economic crises help business owners in urban areas adapt to the future threat of climate change. I'll be asking you questions on how your organization is financing personal and aiding startups and small or medium businesses during this economic crisis, especially for people living in urban areas. Firstly I'll ask about the selection criteria and requirements, secondly will be around the access to finance and grants through the program, then I'll be asking if the program is putting climate change as a priority in their business models, and if the clients who are eligible for this financing scheme are adapting any climate change mitigations, adaptation and resilience. Then I will ask if there is a follow up with the client at the level of commitment towards that new adaptation after the completion of the program. Is this growth in a poor economy favorable for participants or they are not being able to have a competitive advantage? Finally, I would like to know more about the program sponsor coming from developed countries' embassies and their regulation.

Disclaimer: Is it alright if I record the interview so that I can make a transcript?

+++

Introductory questions

In recent years, we have been confronted with more extreme weather conditions and these are expected to aggravate in the future. Examples are increases in rainfall, heat waves or drought. Climate change could affect primarily small business owners that have little means to adapt in urban areas.

1 How can you relate to this shift in new startups and initiatives? Did you experience a type of change of business owners and orientation?

- a. Does your organization have a special offer for clients adapting a green sustainable business?
- b. Does the market for financing small and medium businesses have a significant shift for the green growth approach?

2 Does your client have in their application submitted any information about the climate change threat to their business?

→ Is your organization trying to alert them to the threat of climate change?

If yes:

How are you implementing this alert system? Through informal conversations? Paper requirements for their small plans? Small workshops related to climate mitigation?

If no:

Does your organization plan to help your clients in climate mitigation for their businesses, especially the dying ones at an urban scale?

3 How are the clients paying their loans (if any) and are there any types of loans that are not being paid?

- a. **Does green business face problems with paying their loans?**

- b. **Did small businesses face problems in debt payments caused by climate change hazards? Flooding, drought...?**

4 Do you think clients in the future will struggle in their business caused by climate change hazards and lack of mitigation and adaptation?

Concluding

1. If we have any clarification or new questions that can be deducted from the interview to ask them.
2. Repeat the agreements made at the start [As was stated in the consent form you signed, the recording of this interview and the information deducted from this it will be used solely for the purpose of this research and will only be accessible to our research group and our supervisor]
3. Summarize the most important points.
4. Is there anything that you would like to ask me or any last points you would like to add?
5. If you have any questions or concerns you can contact me at any time.
6. Thank you again for your time and for allowing us to interview you.

Appendix 3:[INTERVIEW GUIDE] For Microfinance and banking organizations.

Respondent:	
Date:	

Thank you for taking the time to talk to me. This interview will last about 20 minutes.

Your answers will help us with our research. I am a student at the University of Groningen and conduct research into how countries with economic crises help business owners in urban areas adapt to the future threat of climate change. I'll be asking you questions on how your organization/NGO/ bank is financing personal, small or medium businesses during this economic crisis, especially for people living in urban areas. My questions will be around the access to finance, secondly I'll be asking if there is a program or service to finance green growth, and if the clients who are eligible for this financing scheme are adapting any climate change mitigations, adaptation and resilience. Then I will ask if there is a follow-up with the client and the level of commitment towards that new adaptation. Is this growth in a poor economy favorable for clients or are they not being able to have a competitive advantage? Finally, I would like to know your opinion on the subject and if you have any personal experience related to financing green businesses.

Disclaimer: Is it alright if I record the interview so that I can make a transcript?

+++

Introductory questions

In recent years, we have been confronted with more extreme weather conditions, and these are expected to aggravate in the future. Examples are increases in rainfall, heat waves, or drought. Climate change could affect primarily small business owners that have little means to adapt to urban areas.

1 How can you relate to this shift in business? Did you experience a type of change of business owners and orientation?

- a. Does your organization have a special offer for clients adapting a green sustainable business?
- b. Does the market for financing small and medium businesses have a significant shift toward a green growth approach?

2 Does your client have in their application submitted any information about the climate change threat to their business?

→ Is your organization trying to alert them to the threat of climate change?

If yes:

How are you implementing this alert system? Through informal conversations? Paper requirements for their small plans? Small workshops related to climate mitigation?

If no:

Does your organization plan to help your clients in climate mitigation for their businesses, especially the dying ones at an urban scale?

3 How are the clients paying their loans, and are there any types of loans that are not being paid?

- a. **Do green businesses face problems with paying their loans?**

- b. **Did small businesses face problems in debt payments caused by climate change hazards? Flooding, drought...?**

4 Do you think clients in the future will struggle in their business caused by climate change hazards and lack of mitigation and adaptation?

Concluding

1. If we have any clarification or new questions that can be deducted from the interview to ask them.
2. Repeat the agreements made at the start [As was stated in the consent form you signed, the recording of this interview and the information deducted from this it will be used solely for the purpose of this research and will only be accessible to our research group and our supervisor]
3. Summarize the most important points.
4. Is there anything that you would like to ask me or any last points you would like to add?
5. If you have any questions or concerns you can contact me at any time.
6. Thank you again for your time and for allowing us to interview you.