

University incubator and entrepreneurial university: case study of the process of setting up a university incubator in a developing country¹

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Abstract

Universities can play a role in promoting frugal innovation by encouraging the valorisation and transfer of research to the socio-economic world as well as the development of skills related to the employability of students. Specifically, through the practices it promotes, an entrepreneurial university can encourage innovations that will benefit vulnerable communities and act in response to their challenges. In a context of weak financial support from public authorities, the University of Abomey-Calavi set up a project to promote entrepreneurship that advances frugal innovation. The present study bases its approach on identifying the actors and factors that favoured the development of its incubation program, five years after its implementation. The same applies to the identification of the frugal innovation practices that it puts in place. The results show, among other things, that the university created a specific organisational framework, with a relatively long incubation period, and mobilising resources from local stakeholders.

Keywords: entrepreneurial university, University of Abomey-Calavi, university incubator, frugal innovation

Introduction

Entrepreneurial universities can be seen as powerful means for local and social development (Clark, 1998; Muller et al., 2016; Clauss et al., 2018; Etzkowitz and Zhou, 2017) as the individual intellectual capabilities and creative spirit of students are connected with institutional resources in education and research (Pinheiro

¹ This paper has been accepted for publication in *International Journal Technology Management*. To be cited as follow : Houssou U., Schulz K.P., Biga-Diambeidou M., Abihona S., (2024) "University incubator and Entrepreneurial university : case study of the process of setting up a university incubator in a developing country". *Int. J. Technology Management*, Vol. 95, Nos. 3/4, 2024

and Stensaker, 2014). With regard to sustainable and responsible innovation in particular (Huesig and Schulz, 2022), universities with a focus on facilitating entrepreneurial activities have shown, around the globe, that university-driven entrepreneurship can reveal development potential (Guerrero et al., 2015, 2016; Huggins and Kitagawa, 2012; Cooke et al., 1997; Asheim et al., 2011). However, most examples concern developed and prosperous regions (Ahmad et al., 2018; Cai, 2014; Cao and Shi, 2021; Clauss et al., 2018; Etzkowitz et al., 2019). These examples show that entrepreneurial universities are likely to generate frugal innovations by, among other things, providing sought-after skills, or by supporting entrepreneurial and innovation initiatives and conducting applied research to address the challenges involved in their environment (Arocena and Sutz, 2017; Brundenius et al., 2017; Bayuo et al., 2020; Cozzens and Kaplinsky, 2010; Klofsten et al., 2019; Heaton et al., 2019; Leih and Teece, 2016; Melkas et al., 2019).

In the area covered by the African and Malagasy Council for Higher Education, bringing together 19 countries of French-speaking sub-Saharan Africa, universities are, however, assimilated to ivory towers, offering courses that do not generally lead to employment (Muller et al., 2016; Gay et al., 2014). This includes both salaried work and self-employment. Entrepreneurship is rarely seen as an end in itself. Several leading education institutions worldwide have put in place initiatives, though not fully developed, to promote entrepreneurship within universities. This is the case of the Forge device at the Ecole Supérieure Polytechnique, part of Cheick Anta Diop University in Dakar, Senegal, and the incubator at Joseph Ki-Zerbo University in Ouagadougou. Another example is the incubator at the University of Abomey-Calavi in Benin (UAC Start-up Valley); it was set up in September 2014 with the intention, among other things, of complementing studies and supporting students in the creation and development of innovative companies with a high potential for decent, sustainable jobs.

This initiative was implemented largely without direct financial support from public authorities but using the university's own resources with a new approach involving 'doing more with less' to mobilise new resources. Given the limited material resources and to ensure its efficiency, the UAC incubator was empowered and institutionalised through a self-managing foundation. Every year, the incubator selects one batch of entrepreneurial projects following a competition, and was on its sixth batch in 2020. Meanwhile 42 enterprises had been created by the end of 2019.

The establishment of entrepreneurship-support activities is a specific area recognised for promoting the concept of the entrepreneurial university. This set of activities on the one hand stimulates and encourages entrepreneurship, and on the other hand provides support to the promoters of business creation projects (Bhayani, 2015; Kirby et al., 2011a; Pinheiro and Stensaker, 2014). Several operationalisation tools have been identified in the literature as elements that support and promote entrepreneurship, and they include university incubators (Kirby et al., 2011a; Etzkowitz and Zhou, 2017). It is not yet clear whether these 'elements' are equally viable for entrepreneurship in universities in less-developed countries.

Therefore, this study aims at retracing as a narrative the approach of the University of Abomey-Calavi (UAC) in the implementation of its incubator program in a context of frugal innovation. Despite no unanimous agreement on the definition of this concept, several authors, as reported by Fischer et al. (2021), understand frugal innovation as: events associated with products and services offered at affordable prices in socio-economic environments characterised by resource scarcity (Hossain et al., 2016; Leliveld and Knorringa, 2018). These views comply with the necessity to build entrepreneurial initiatives using limited existing resources. In essence, the aim is to answer, through the lens of frugal innovation, the question of how a sub-Saharan African university set up a successful incubator program in a context of scarce resources, while reflecting specifically on two central questions: i) What actors/factors facilitated the setting-up of the UAC incubator program? ; ii) What are the frugal innovation generating practices induced by the implementation of the UAC incubator? More explicitly, do these practices involve research and technology transfer measures, or activities to support the development of skills and entrepreneurship?

There is little information in the literature on the establishment of university incubators in the African context. The first descriptive elements of the establishment of the incubator at the University of Abomey-Calavi point to a 'do-it-yourself' process, in other words, making do with what we have, which is not based on existing models of organisational development.

This study contributes theoretically to a better understanding of the entrepreneurial university in the specific

context of a developing region, involving limited material resources and specific demands on (frugal) innovation. In addition, it generates practical guidelines for policy makers.

In what follows, we will present the context for setting up the UAC incubator, then the methodology used and the case description, and finally a discussion that will lead to our recommendations.

Theoretical perspectives

Entrepreneurial university (ENU)

Although the literature is ambiguous in its definition of the entrepreneurial university (Compagnucci and Spigarelli, 2020; Markuerkiaga et al., 2018), there is a general consensus that an entrepreneurial university (ENU) is an institution that serves the community and has a strong bond with it. Etzkowitz (1983) and Clark (1998) were among the first to have worked on the subject and considered it to be a university that University incubators and entrepreneurial universities serves its community. The ENU marks a paradigm shift from the traditional university, which is limited to teaching, and research activities. Etzkowitz (2003) mentions a third dimension of the ENU, integrating it into a triple helix of university, industry and government. Following this paradigm, the ENU implements the functions of innovation, teamwork, risk-taking and reactivation in the face of the development challenges in its community (Bizri et al., 2019; Kirby et al., 2011a; Markuerkiaga et al., 2018; Carayannis et al., 2018).

In addition to teaching and research activities, the dimension of promotion and support for entrepreneurs is clearly identified as a differentiating element of the ENU. Through conceptual models, the ENU has been characterised by activities and indicators. There are three dimensions: i) teaching activities, ii) research activities, iii) entrepreneurship promotion activities.

The indicators often found in the literature are: jobs created by university spin-offs (scaled to the size of the university; scaled to the total number of jobs in the region); aggregate turnover of university spin-offs (proportionate to the number of university spin-offs or university R&D personnel); retention rate of university spin-offs; rate of return on public investment; percentage of entrepreneurs among graduates; percentage of entrepreneurs among university staff; university participation in the development of regional/national entrepreneurial strategies and policies; and participation of universities in regional clusters. More specifically, Etzkowitz and Zhou (2017) select several indicators including: the number of university partnership agreements with companies; the number of university acceleration/incubation programs for start-ups (available outside the university); and the presence of a university technology park (science park) and the number of companies established there.

In sum, the entrepreneurial university can be seen as an innovative university that can recognise and create value (Fischer et al., 2021; McClure, 2016). It is a natural incubator for teachers and students to launch innovative activities in line with the needs of community stakeholders, and a tool that contributes to the adaptation of entrepreneurship promotion policies to the local context, as suggested by Meissner et al. (2018).

University incubators and entrepreneurial universities

A university incubator is recognised as a specific establishment for promoting university entrepreneurship, especially for the creation and survival of new businesses (Barbero et al., 2014; Guerrero et al., 2014; McAdam and McAdam, 2008). Guerrero et al. (2018) citing Urbano and Guerrero (2013), define it as

“a non-profit organization that not only provides services, such as rent discounts, access to capital, office or shared lab space oratory, technology transfer services, and faculty consultants –for students, faculty staff, and alumni, but also reinforces an entrepreneurial-international culture at all academic levels” [Guerrero et al., (2018), p.155].

The positive effect of university incubators is shown by Eveleens et al. (2017) especially to mobilise funding, while Bergek and Norrman (2008) cite them as a tool that has contributed to the development of technology and innovation. These incubators contribute to the creation of a community of new businesses (Bouncken, 2018) and the transfer of research results to the socio-economic world (Lopes et al., 2018). In addition, the

great success of 'Silicon Valley' and especially the Oxford model illustrate how much university incubators can contribute to the national innovation system (Wann et al., 2017).

Moreover, beyond stimulating economic development and technology transfer, incubators could offer the opportunity for a more holistic approach to entrepreneurship education (Marvel, 2013). In our study, we focus on the concept of a university incubator that can produce frugal innovation under certain conditions.

Frugal innovation (FI)

There is some common understanding about frugal innovation as a simplified 'product' in terms of its characteristics and use. However, more detailed descriptions of the concept often remain vague. Concepts also vary according to the discipline and the context. However, Fischer et al. (2021) report that most authors refer to events associated with affordable products and services in socio-economic environments characterised by resource scarcity (Hossain et al., 2016; Leliveld and Knorringa, 2018), and that frugal innovation is an approach in which the challenges of resource constraints and adversity related to poverty, institutional vacuum and environmental threats need to be overcome (Pisoni et al., 2018).

In their work, Fischer et al. (2021) elaborate that universities' knowledge transfer processes are likely to be a key lever in driving inclusive development when they take on pressing societal challenges (Arocena et al., 2015; Melkas et al., 2019; Pisoni et al., 2018; Steinfield and Holt, 2019). They point out that a dimension often neglected in the literature on frugal innovation is associated with the scientific competencies of universities, which can enable more efficient use of resources and improved functionality for vulnerable communities (Dost et al., 2019; Rao, 2013). These authors therefore esteem that the provision of university research dedicated to solving social needs at the local level functions as a key catalyst for frugal innovation (Niroumand et al., 2020).

Entrepreneurial universities and frugal innovation

Although few published studies concern the link between the entrepreneurial university (ENU) and frugal innovation (FI), there is evidence that the entrepreneurial university is a creator of innovation and is oriented in a perspective of service to the community. The ENU and FI are likely to have the same effects, particularly with regard to the needs of less-developed regions. One may then wonder under what conditions an innovation or process generated by an entrepreneurial university could be qualified as frugal (Fischer et al., 2021). The attribution of frugality is not a decisive factor for an ENU, but rather a set of criteria (Agarwal et al., 2017; Wimschneider et al., 2020). For Fischer et al. (2021), entrepreneurial universities create frugal innovation through their research transfer activities.

Generally speaking, any process within the three dimensions of the ENU (teaching-research-entrepreneurial activities) can be subject to the criteria of frugal innovation. When an entrepreneurial university innovates for the benefit of grassroots communities or the most vulnerable strata as well as civil society, it does so based on the contextual needs and can therefore be assumed to be frugal (Arocena and Sutz, 2017; Brundenius et al., 2017; Klofsten et al., 2019; Pisoni et al., 2018). For Melkas et al. (2019), students are a key element through which entrepreneurial universities manage to connect with communities and induce frugal innovations.

Operationally, Fischer et al. (2021) identify two specific levers as the channels through which the entrepreneurial university can generate innovation based on the criteria of FI: i) technology transfer and ii) capacity building.

The activities of the entrepreneurial university that are likely to generate frugal innovation are presented in the table below.

Table 3.1: Activities facilitating frugal innovation and entrepreneurship
adapted from Fischer et al. (2020)

Technology transfer	Capacity building
- Collaborative research - Contract Search - Patent transactions/patent spill-overs - Labor force - Mobility - Publication/conference/networking/sharing - Research with industry - Cooperation with companies, SMEs, Start-ups - Classroom learning - Visit and field work	- New job opportunities - Flow of appropriate graduates - Training addressing social inclusion - Collaboration to provide relevant skills to students - Design for cost - Training in frugal innovation - Entrepreneurship education - Example of start-ups to be used in courses (case study) - Inviting entrepreneurs to participate in teaching and mentoring activities

The table above shows by category (technology transfer or capacity building) the type of activities that can generate frugal innovation. In sum, irrespective of whether a university meets all of the ENU criteria or not, it can create a dynamic that promotes technology transfer and skills development. The aim is to link education to the social reality of low-income communities with low-material-resource institutions and the most disadvantaged groups. Students are made aware of the most pressing social needs and are supported in finding ways to meet them through frugal-type innovation.

The case of the University of Abomey-Calavi incubator

This case study focuses on the University of Abomey Calavi (UAC) in Benin. This university was the first in Benin, created in 1970 in the wake of independence, and it has remained the main public university with more than 60,000 students¹ and indicators of active interaction with local stakeholders.

The objective of this study is to illustrate how, in a context of scarce resources, which can be seen as one of the characteristics of frugal innovation, the UAC has been frugal in facilitating entrepreneurship and the emergence of innovation outside the university context. The study focuses particularly on the university's incubator program that was set up in 2014.

Research methodology

The research process is of an exploratory nature (Stebbins, 2001). It follows a case study rationale to provide in-depth insight into process and structures (Flyvbjerg, 2011; Yin, 2009). This means that the complex case has been comprehensively studied and analysed from different perspectives. Our empirical research process was organised in three stages: i) document analysis, ii) interviews with key persons in the ENU process (semi-structured), and iii) a feedback workshop with entrepreneurs.

First, we conducted an in-depth assessment of the incubator's public documents in order to understand the institutional framework and entrepreneurial orientation behind its establishment. To this end, we identified: i) the commitment of university leaders to interact with local stakeholders (the local authority, the chamber of commerce and industry, and the central government), ii) the strategies to make the services offered inclusive and accessible (the involvement of stakeholders and the relatively low amount of fees paid by students), iii) the UAC incubator activities designed to involve local entrepreneurs effectively in the implementation of the activities.

In the second phase, we conducted semi-structured interviews with the UAC managers and those in charge of the operational management of the incubator. These included: the secretary general of the university; the

head of the cooperation department and two of his collaborators; the rector of the university and the vice-rector in charge of professional integration and two of their collaborators; the executive director of the incubator; the dean of the faculty of humanities and social sciences; and the dean of the faculty of economic sciences and management, all with their respective student-placement managers. We also interviewed the director of the polytechnic school and the director of the national school of applied economy and management with their respective collaborators in charge of the professional insertion of the students. The final interviewee was the head of the quality assurance unit of the university. In total, 21 people took part in these interviews.

The choice of interviewing these agents was made in order to obtain a multidimensional view of the process. The questions revolved around initiatives taken by the university or institutions visited in order to interact with economic actors in the area, activities to promote entrepreneurship, and their involvement in the process of setting up the incubator. The interviews lasted approximately one hour each and were based on a semi-structured interview guide. The topic of frugal innovation was not explicitly addressed in the questions, but questions were asked in relation to the activities that generate frugal innovation following the model by Fischer et al. (2021). They were recorded and transcribed verbatim. The coding process followed the structure of the interview guidelines but also took into account the outcomes of the interviews. Therefore, coding can be seen as a combination of both inductive and deductive techniques. The analysis was mainly thematic (Guest et al., 2011).

Thirdly, we visited the incubator and organised a focus group with nine young beneficiaries to collect their feedback followed by a discussion. These young business leaders were among the first incubator service beneficiaries and were selected by lottery from the list of companies that had graduated from the incubation process. Out of 15 expected participants, nine of them ultimately responded to the focus group session which centred on their feedback following their participation in the incubation process: the practices they appreciated positively (on training, coaching, personalised follow-up), the practices to improve, and the practices to continue. The main ideas were noted in a collaborative document during the session. Also, feedback was given to the actors to encourage them to improve the entrepreneurial process. The feedback process was based on the same manual as the expert interviews to glean comparable data from different perspectives. The analytical procedure was the same as for the interviews.

For the analysis of the incubator-facilitated entrepreneurial process, the three data sources were combined.

Case description

The University of Abomey Calavi is the main university in Benin. Benin is located in West Africa, and is a developing country in which higher education faces problems of massification, limited use of ICT, and low professionalisation in teaching (Ezin, 2015). As with other countries in the African and Malagasy Council for Higher Education (CAMES) area, university graduates face difficulties entering the job market, characterised by a high rate of underemployment. These universities are often assimilated to ivory towers offering courses that do not lead to employment, too often without a strong active link with socio-economic actors (Muller et al., 2016; Gay et al., 2014). Public funding for universities is not commensurate with their needs.

In 2012, the new rectoral team at the UAC made the strategic choice to boost interaction with community stakeholders. For example, a partnership agreement was signed for the first time with the municipality of Abomey-Calavi in November 2012, 42 years after the university was founded. A strategic program is being put in place that includes several specific initiatives to promote entrepreneurship and serve the community. For the new leaders, the university is an offspring of the city and must rise to meet its challenges. It must accompany its graduates in their insertion into employment or self-employment.

The UAC has set up several structures capable of implementing its policy of professional insertion of its graduates. They involve promoting research results on the one hand, and capacity-building on the other hand. These structures are² :

- The Campus Employment Desk (GEC), which was set up by the National Employment Agency (ANPE) on the Abomey-Calavi Campus to bring the Public Employment Service closer to the students;

² Source : Activity Report 2012-2017, UAC

- Park of Business Incubators called "UAC Start-up Valley" initiated in September 2014. Its main missions are to: (i) support and mentor university graduates in the creation and development of innovative enterprises with high potential for decent and sustainable employment; (ii) to disseminate the entrepreneurial culture in the university community; (iii) to sustainably reduce the unemployment rate of university graduates.
- Professional World Week (SEMOP), which encourages a better mix of professionals, learners and trainers, and provides an opportunity to reflect on a number of themes to better target training courses towards the real needs of the labor market.
- The UAC Volunteer Service, which aims to train young Beninese through by changing mindsets and developing values and abilities adapted to the evolution of today's world. The ambition is to make them capable of accomplishing the missions required at all levels of decision-making.
- This study focuses on the incubator park in order to identify which factors have facilitated the establishment and achievement of those results that bear evidence of frugal innovation.

This study focuses on the business incubator park in order to identify the leverage that an incubator can provide to promote entrepreneurship, and also because it is the only initiative for which the UAC has set up a specific management mechanism.

The UAC Start-up Valley Program is the most active of the four programs of the UAC Foundation (FUAC). This program is composed of an incubator and an accelerator. The UAC Start-up Valley Incubator was launched in 2015 and has set up an incubation process spread over 4 years, including 1 year of preparation for the entrepreneurial profession and 2 to 3 years of follow-up of the businesses created by the beneficiaries. The incubator selects one batch per year through a competition, and is currently on its 6th batch. Each annual call for applications enables an average of 600 applicants to be registered in 200 groups. Due to its limited reception capacities, the incubator selects an average of 150 beneficiaries in 50 groups. In the first five batches alone, 684 young men and women in 220 groups benefited from entrepreneurial education, 94 business projects run by the groups reached maturity, 42 collective enterprises were created with an average annual turnover of 500 million West Africa Francs (1 million USD) , and 420 direct jobs had been created at the end of 2019.

Outcomes – Description of the incubation process at UAC

A paradigm management shift from public to private

The UAC incubator is administratively managed by the university of Abomey-Calavi foundation (FUAC), a non-profit association with an autonomous management system, unlike a classic public administration structure. University officials recount that during the first months following the incubator's creation, management experiments based on a standard university framework did not allow the project to get off the ground. The need to make it a specific, reactive organisation was then decided and written into in the statutes. For example, article ten states that the executive director must come from the socio-economic world.

The incubator of the University of Abomey Calavi was set up with a view to its operationalisation by non-university actors. The setting up of a foundation was the lever that made it possible to create an organisational framework to promote interaction between the university and actors on the field. The statutes feature several types of member: 'college of founders', 'college of qualified personalities', 'college of donors', who sit on its board of directors and who are mostly from economic communities. Specifically, the list of board members includes representatives of the central government, local businesses, and NGOs. The president of the board of directors from 2015–2019 was the president of the platform of civil society organisations. Of the 11 members, 27.27% are from academia.

Furthermore, for the establishment of the FUAC's (start-up) core resources, it should be noted that the university did not use public financial resources. In fact, in terms of financial contribution, the statutes identify two types of member (founder and donor). For example, a founding member: "represents the natural

or legal persons who, prior to the creation of FUAC, have irrevocably allocated property, rights or resources to the purpose of FUAC. The three largest contributors will be retained at the start of FUAC's activities" (Article 7, Statutes). Thus, the university has mobilised socio-economic actors to finance actions related to the missions of the university. In particular, the purpose of the foundation is explicitly stated as the professional insertion of graduates and service to the community. Thus, the initial core funds were constituted by a contribution in kind from the state and the university's municipality. The state has provided a three-story building and currently provides water and electricity, the Abomey-Calavi municipality has made available an area of 105 hectares for agricultural activities, and the university itself has made available financial resources to cover operating costs for five years. Valued as a financial resource, this contribution from the stakeholders represents about 70% of the resources granted from outside the university and which were used for the constitution of the foundation. Added to the resources invested by the university to carry out feasibility studies, the contribution of external actors (state and municipality) makes up 58%.

In general, from 2014 to 2020, it has been noted that several types of actor contributed to implementing the incubator's activities, with total estimated contributions (in kind and cash) amounting to more than 3.3 million euros. A large portion of the contributions comes from the local authorities, constituted by the municipality in which the university is implemented and other surrounding municipalities that have made available land estates for the development of agribusiness projects.

Table 3.2 : Source of incubator income from 2015 to 2020

<i>Nature of resources type</i>	<i>Category</i>	% contribution
Cash contribution	Development partners	1,73%
	Incubator service delivery	2,94%
	Other programs of the University	4,53%
	University	6,85%
Total Cash contribution		16,05%
Contribution in kind	Development partners	7,30%
	Enterprises	1,35%
	State central	11,41%
	Town councils (local authorities)	63,89%
Total contributions in kind		83,95%
Total		100,00%

The incubator targets four groups of people: i) graduates and final year students at the UAC, ii) graduates and final year students at other public universities, iii) graduates and final-year students at private universities, and iv) graduates and final-year students at technical, industrial and agricultural high schools. The majority of the target audience is made up of young people in need of employment. The limited fields of intervention (agribusiness, technologies, services) in line with the needs of the local economy has led to the concentration of projects in the same economic sector. The same applies to the strategic choices for operationalization, which are based on an entrepreneurial and continuous improvement approach: we note that innovation, group entrepreneurship, recruitment at the business idea stage, and learning by doing are explicitly stated.

Research exploitation and technology transfer measures

The exploitation and transfer of technologies resulting from research is one of the objectives of the FUAC. It aims to support and promote scientific and innovative research that contributes to transferring technology to the local and national economic sectors. To do this, the incubator welcomes projects from students and teachers who need support to move from a research idea to a business idea. This is the case of 10% of projects that result from the promotion of theses, pursued thanks to the incubator system.

The selection process shows the achievement status of the prototypes in the pre-incubation phase. This stage allows projects resulting from research to be restructured into viable, marketable projects. In addition, throughout the incubation process, the beneficiaries of the program are put in contact with companies and mentors from the professional world. These interactions provide opportunities for sharing and networking around the entrepreneurial ideas that have emerged from some members' research.

The store promoting the products of the incubated companies is also an essential link in the popularisation process. The same is true of the incubator's website, which presents the incubated companies, and the 'Business Week', during which the products of the incubated companies are exhibited.

In addition to the launch of technology transfer initiatives, there is also a moderate practice of patenting innovations. While not systematic, some of the incubated companies report having patented their innovation.

Lastly, the incubation process is divided into four phases, including a post-incubation phase. This latter phase lasts 12 months and by the end of it companies are fully operational, complete with turnover and staff. This mechanism allows for a high rate of concretisation of the business ideas selected for incubation and therefore of the technological innovations.

In short, the UAC incubator is a lever for the exploitation and transfer of technologies through projects that result from the scientific research it hosts the specificity of a prototyping stage in the incubation process, and a post-incubation phase that ensures the maturity of the company. The incubator's shop and website are also vehicles for University incubators and entrepreneurial universities disseminating and popularising the innovations developed, as well as the Professional World Week organised each year.

Support for skills development and entrepreneurship

The selection of the incubator and its support system enable students to acquire new and cross-disciplinary skills. The duration of the recruitment phase (four months) and the organisation of three technical workshops on entrepreneurial culture and business project formulation enable a large number of students to be reached. Although only an average of about 85% are retained, the majority of candidates acquire new skills that improve their employability.

The technical workshops and incubation training programs are structured to train entrepreneurs and employees who are committed to creativity and capable of driving innovation processes in organisations. The process offers new career opportunities compared to the period when the university did not have an incubator. Personal development and training on basic entrepreneurial principles are likely to broaden the skills of the beneficiaries.

In addition, during the incubation phase, each group is monitored by a coach and mentor from among local entrepreneurs. This helps to establish links and provide partnership opportunities for new businesses.

Moreover, the strategic choice of organising projects to be incubated into groups of two to three students encourages teamwork skills (team spirit) and facilitates group entrepreneurship. In a context such as that of Benin, group work is recommended to ensure the sustainability of start-ups.

Furthermore, the incubation and post-incubation phase, which lasts a total of 36 months, enables the

incubated students to become entrepreneurs and put themselves in a real-life situation to acquire entrepreneurial skills. This mechanism is intended to protect young companies against the risks that undermine the growth of small businesses in the Beninese economy, where the business failure rate is 85% at three years (OIF, 2015).

The financing mechanisms put in place are not based on the traditional financial system. Precisely, the incubator makes land available for certain projects in the agribusiness sector. In addition, a start-up fund has been set up for incubated businesses, thanks to a partnership with a Netherlands organisation (NUFFIC), which is lent to businesses through a micro-finance institution. The incubator serves as a guarantee fund and the loan interest rate is low (6%) compared to an average of 12% on the conventional market.

For the beneficiaries we met, the incubation facility has been an important lever in their careers. It has enabled them to give meaning to their lives and devote themselves to their business activities. While they identify elements that could be improved in the implementation of activities, they all agree on the relevance of such a tool. The numerous prizes received at various competitions also illustrate the quality of what is being done. They include: the Tony Elumelu Entrepreneurship Program prize (\$5,000 per winner) in 2017; the 2017 grant from the Belgian Technical Cooperation for the development of market gardening (\$18,000); financing from the National Fund for the Promotion of Entrepreneurship and Youth Employment, etc.

Discussion

In the socio-economic context of Benin, the activities of the UAC incubator have responded to the need to support the entrepreneurial initiatives of UAC students. The incubator has contributed to boosting the university's interaction with local and regional socio-economic actors. This is in line with the political ambition of the initial leaders.

The target of the UAC incubator is clearly regional development, to improve living conditions, create jobs, and therefore contribute to local development. Bearing in mind the general approach of entrepreneurial universities (Bhayani, 2015; Kirby et al., 2011a; Pinheiro and Stensaker, 2014), this focus on local development according to actual needs is specific to this entrepreneurial university in a developing country. Such a situation, as Meissner et al. (2018) suggest, calls for specific policies adapted to the local context.

The idea of a co-financed university incubator is also frequently found in entrepreneurship models (Kirby et al., 2011a; Etzkowitz and Zhou, 2017). What is different here, though, is the clear distinction of roles. The incubator model, considerably co-financed by private institutions, on the one hand provides flexibility and enables creativity, while on the other hand, public support specifically fills the gap when private resources come to their limits. Also worth mentioning in this case are the rectoral authorities, central government and municipality of the university town which all agreed to support the project by providing initial funding to the foundation. Therefore, a much focused incubation system could be established that capitalises on the various stakeholders. This is in line with the recommendation of Fischer et al. (2021) to include social partners in the management bodies of universities. The result is a closer alignment between scientific priorities and social needs, faster dissemination of research results and increased trust and transparency (Cope et al., 2018; Willyard et al., 2018).

We can also note that the entrepreneurial practices developed by the incubator include the provision of a coworking space, and this in connection with the developments of Bouncken (2018) in this area, including the development of a community of new businesses.

The UAC incubator has particularly traced its path, without trying to resemble a model in full. It has done so by adapting to the realities of its context, which enables it to contribute to enriching the taxonomy of entrepreneurial universities, as suggested by the work of Markuerkiaga et al. (2018) and Carayannis et al. (2018).

We particularly identified the following factors that contributed to the achievement of results: the specific organisational framework; the specific incubation process; the choice of area of intervention; alternative

project funding mechanisms; and the cost of accessing the program.

- (i) The specific organizational framework of the project comes from the choice to house the incubator within an autonomously managed foundation, and in particular to provide in the regulatory framework (the texts) that the person in charge of executive management cannot come from the academic world. The involvement of actors from the socio-economic world in the management bodies, in particular the allocation of seats to contributing members, is also an element that makes it possible to create an atypical management space where the university is an actor of the entrepreneurial world. The university has therefore used the partnership to reach this end.
- (ii) The setting up of the incubator was supported by the university's rectoral team to ensure the alignment of the project with the priorities of the organization and the achievement of a paradigm shift. In this respect, it should be noted that without political support at this level, it seems unlikely that the project would have been taken outside the academics' scope of action and that a specific organizational framework would have been created for it.
- (iii) In addition, the choice of the intervention sector in relation to the needs of the local market made it possible to focus projects on sectors related to local economic concerns and thus facilitated economic opportunities. The same applies to the mobilization of local entrepreneurs for mentoring activities and interaction with incubators. However, this can limit initiatives and ideas for business development. Instead, the UAC preferred to focus on a few promising sectors at the outset to mobilize a model that could later be extended to other sectors of intervention, in line with the needs of communities.
- (iv) The UAC incubation process lasts 48 months (4 years) of which 12 months are for the recruitment and pre-incubation period. This long process ensures that companies have the chance to mature with at least one year of activity and human resources, up to the exit of the companies at the end of the process. In addition, the alternative financing mechanisms proposed, such as the provision of land to overcome the difficulties of young graduates in obtaining land titles, the establishment of a guarantee fund at a financial institution, and the encouragement of young people to participate in calls and competitions for business plans, have encouraged the mobilization of financial resources outside the traditional system. Since its creation, when considering all the resources contributed (in kind or in cash), it can be said that for every euro spent by the UAC, it has managed to mobilize 14.61 euros from local actors made up of authorities, development partners, businesses and the central state. It has also been able to seek finances from other internal programs to support the incubation program (4.53%). The same is true of resources generated by the services provided by the incubator.
- (v) Lastly, the amount of 40,000 FCFA (60 euros) paid per project group to benefit from four years of support and project resources (local and other) during the first 12 months, seems attractive in comparison with the offers available on the market. Moreover, for the University of Abomey Calavi, the payment of such an amount by the beneficiaries is a guarantee of the participants' interest in the program and not a fee to cover its costs.

The clear focus on valuing research and developing students' skills refers to the principles of creating frugal innovation through a university incubator (Fischer et al., 2020). The training activities concerning the admission process to the incubation program allows for a large number of students to be impacted and their skills to be enhanced. The UAC incubator, through its system, provides relevant skills, and supports entrepreneurial and innovation initiatives by ensuring the valorization and transfer of research in a sector of activity linked to the needs of the local economy. It induces frugal innovation if we refer to the works of Arocena and Sutz, 2017; Brundenius et al., 2017; Fischer et al., 2020; Guerrero and Urbano, 2019.

Table 3.3 provides an overview of how the demands for facilitating frugal innovation in entrepreneurship correspond with the concrete activities and structural means applied at UAC. It also shows the fields covered and the existing deficits. To this end, we observe that capacity-building is the area in which frugality is most notable. The ability to improve the skills of students who participate in the recruitment process (those who are retained or not), the training in frugal innovation in the incubation process, as well as the low cost of access to the process are characteristic elements of the frugality of the UAC incubator. These practices are similar to those found in the literature independently from the Fischer et al. model (2020) (Melkas et al., 2019; Arocena and Sutz, 2017; Guerrero and Urbano, 2019).

Table 3.3 : Activities facilitating frugal innovation and entrepreneurship at UAC following the model by Fischer et al. (2020).

Technology transfer	Observations
Collaborative research	The valorization of research is an explicitly stated objective. 10% of the projects are the result of a doctoral thesis. These projects involve practitioners from the professional world.
Contract Search	Some projects resulting from research may win a prize or a grant from a partner, but there are still no projects that are set up on the basis of research contracts.
Patent transactions/patent spill-overs	Patenting is not systematic although there are companies that have patented their ideas in order to protect them
Labour force	Little existing
Mobility	Little existing
Publication/conference/networking/sharing	Researchers who participate in the incubator do not go through its channel to participate in conferences or publish their work
Research with industry	Research on prototypes or incubated projects is carried out with actors from the industrial world who intervene in the accompaniment of the projects
Cooperation with companies, SMEs, Start-ups	The incubator is developed in an ecosystem with several partners that promote cooperation with companies and other SMEs
Classroom learning	During the training sessions, learning is done in class
Visit and field work	Visits and field work are organized with even experimental fields
Capacity building	
New job opportunities	The incubation process enhances the skills of the candidates in order to strengthen their employability and provide them with new job opportunities
Flow of appropriate graduates	The incubator recruits students to incubate periodically
Training addressing social inclusion	The incubator's training program includes modules on social inclusion
Collaboration to provide relevant skills to students	Several partnerships have been established to strengthen the cross-cutting skills of participants
Design for cost	The cost of accessing the incubator's services takes into account the social level of the students. And other services are offered at a price that evolves according to the growth stage of the incubated company
Training in frugal innovation	The incubator's training program includes modules on frugal innovation
Entrepreneurship education	The incubator's training program includes modules on entrepreneurship
Example of start-ups to be used in courses (case study)	Case studies are based on local companies and startups
Inviting entrepreneurs to participate in teaching and mentoring activities	Local entrepreneurs are involved in training and mentoring activities

Conclusion

Based on this case study, it can be concluded that the incubator, which is attached to the university but not fully integrated, provides the organisational basis for a successful facilitation of entrepreneurial activity. In contrast to other descriptions of ENUs, this example from the developing country Benin shows that the ENU is here understood as a means for regional development in diverse ways. Therefore, the promoted entrepreneurship activities integrate regional players and focus on local innovation demands and locally available resources.

In addition, in its implementation, the incubation program has taken into account the valorisation and transfer of research with, in particular, business projects set up on the basis of research work, the involvement of local businesses, and field visits. The same applies to the development of several capacity-building activities, notably promoting the acquisition of skills related to employability and new employment opportunities, as well as in the fields of social inclusion and frugal innovation. All this is done at a cost of access that takes into account the social level of the students and a mentoring relationship with local entrepreneurs.

In order to set up its incubation program, the university had to establish a specific management framework involving the participation of socio-economic actors and civil society around a specific, long incubation pathway, thanks to the partnership with socio-economic actors. The same applies to the choice of orienting projects towards certain sectors of economic activity in line with the expectations of the local ecosystem. Such a strategy has led to frugal innovation.

In addition to the theoretical contribution exploring the links and needs of ENU and frugal innovation in developing countries, this study has practical implications regarding how to organise entrepreneurship for frugal innovation in a developing country university context. It highlights the process of setting up an incubator to enable its replicability with lessons for key stakeholders: academics, local businesses, and policy makers.

This study has limitations. It focuses on the organisational means and conditions of the institutional framework. The entrepreneurial activity itself, which includes idea generation, product development processes, and business plan development, has not been taken into account. This is an important line of research to assess how these processes adequately contribute to this university-led frugal innovation entrepreneurship. Furthermore, the results presented here represent a single case example and therefore an exploratory study. Further research is needed to verify the results in other comparable cases of UIEs in developing countries.

Finally, the current dynamics of the UAC incubator deserve to be referenced and monitored over time so as to conduct a retrospective study in the coming years to determine whether it has remained on its trajectory. However, in the short term, we can already observe the perception of the current stakeholders in relation to frugal innovation.

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