A Software Business Incubation Model Using ICTs for Sustainable Economic Development in Uganda

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Abstract. In low-income countries, a recurring challenge in the use of mobile and web-based services to foster development is to ensure the economic sustainability of those new services after their initial launch. The Makerere University Software Business Incubation programme tests a novel approach to this challenge, by applying a venture-capital-like management discipline to ICT innovations created by students, recent graduates and staff of the College of Computing and Information Sciences. The incubation process, which has been refined over the past 3 years, has already resulted in six new business start-ups. Scaling up appears feasible, because of the very low capital funding needs of the programme: the new services are profitable from the start. This paper describes the programme's structure and operational processes and gives several examples of the new services created, along with a discussion of the challenges faced and solved by the programme's management.

Keywords: sustainable innovation, business incubation, venture-capital management, mobile services, web applications.

1 Introduction

A recurring challenge for new mobile and web-based applications to foster development in low-income countries is to ensure the economic sustainability of those new services after their initial launch.

Governments, NGOs and private corporations collectively solicit thousands of proposals for worthy new mobile and web applications in sub-Saharan Africa each year, via competitions for research grants, prize money, Millennium Development Goal programmes, innovation centres, job creation schemes, rural poverty eradication programmes, emergency aid support, health and education surveys, and private-sector software development jobs.

Many millions of dollars are awarded each year and hundreds of new applications are trialled. Most of the trials terminate within a year or two, for lack of funds to scale up, or for lack of sufficiently motivated users.

The net results are a few popular and self-sustaining services such as Mobile Money or Frontline SMS, an enduring cadre of program managers and consultants, and thousands of engineering and ICT graduates with experience in making proposals but very few jobs.

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This paper reports on a different approach to fostering economic development through ICT services and applications, based on the premise that the venture capital management processes that have worked in North America, and are working now in Europe and Asia, can also work in sub-Saharan Africa.

2 Background

We begin with a short summary of the prevailing economic conditions in sub-Saharan Africa, Uganda in particular. These conditions determine how the venture capital management process needs to be localised.

Like many west and east African countries, Uganda has experienced healthy economic growth in the past decade, averaging around 6% per year [1]. The export potential of natural resources and agriculture is attracting investment from Asia. The political environment is still unpredictable, but its volatility is decreasing.

Use of English as the universal language of education, government and business has reinforced this. Multi-party political systems have taken root and will gain strength in upcoming elections, although the opposition parties in most areas probably do not yet have the organization or discipline to outpoll the incumbents.

Unsurprisingly [2], people have migrated to the cities (especially Kampala) because their opportunities are better in the city and because they know relatives who have become relatively prosperous there, even though the cost of living is higher than in the country. Many people hold two or more jobs in order to meet daily expenses.

The use of mobile telecoms and mobile applications is exploding: the spread of phones, internet and credit cards is being compressed into a decade or two, instead of over half a century as in Europe and North America. Over 95% of people in urban areas have access to phones (either their own, or through family and friends), as do about 75% in rural areas. But local capital for investment is scarce – especially for locally managed investment – and interest rates are high.

Potholes, traffic jams, paper records, queues, power outages and stock-outs are universal. City dwellers of all economic levels lose many hours to the resulting inefficiencies; hence are chronically short of time. Patience becomes not so much a virtue as a coping mechanism.

Local software developers and clerical staff are abundantly available, but usually need on-the-job training or coaching. Experience in business planning, modelling and operations management is scarce. Formal qualifications and credentials are highly respected but do not imply practical experience or initiative, so (deservedly) carry less weight than a first-hand knowledge of local conditions and practices. The strong oral tradition in Africa fosters impromptu discussion and seat-of-the-pants management at the expense of writing and regular meetings.

On the other hand, the concentration of raw talent and learning ability among university students is formidable. The public educational system is highly competitive, so about half of all university students are selected from the top 5% of 20-year-olds. In Uganda, most of these go to Makerere University, which is the

oldest, largest and has the best reputation. The great majority of Makerere graduates stay in Kampala and do their social networking face-to-face at government round-tables and workshops, industry associations, boards, Rotary clubs and the like. The physical proximity facilitates contacts and introductions among faculty members, government officials, business owners and executives, consultants and NGO representatives.

Overall, a self-reinforcing combination of widespread inefficiencies, reported obstacles to business [3], lack of traditional inputs for industry research or financial assessments, shortage and high cost (~19%) of local investment capital, has led to an abundance of unexploited commercial opportunities – despite the availability of technical and business university graduates and the government's ardent desire to put them to productive work. Most of these opportunities are unknown to foreign investors because information about them is unpublished and uncirculated outside the local word-of-mouth networks [4].

Figure 1 summarizes these principal dynamics of Uganda's current social and economic development.

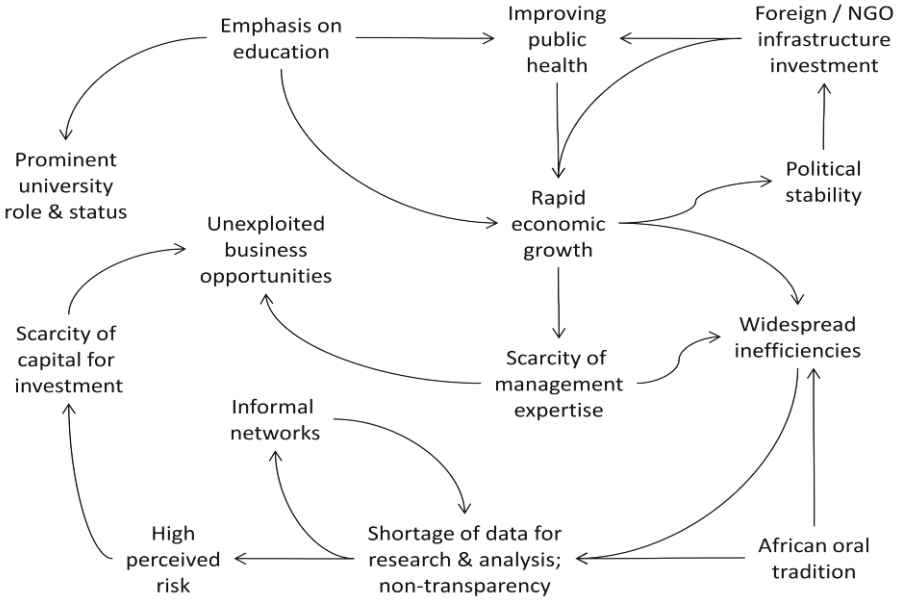

Fig. 1. Current socio-economic development dynamics in Uganda

3 System Description

With the rapid growth of Uganda's economy, the many and obvious inefficiencies represent opportunities to create wealth. The burgeoning of interactive SMS and mobile money services has illustrated this. In the coming decade, as computing and

software become pervasive in government, industry and education, there will be many, many more software business opportunities.

A mechanism is needed for bringing together the owners of problems, the creators of solutions, experienced managers and sales people, and financial backers or investors. Out of this confluence, new businesses can be created.

An early-stage venture capital scheme is a proven way to do this.

Rather than proceeding (as in most contests and incubation centres) directly to software development on projects that appear original, the Makerere programme requires its applicants to function as follows.

1	Working from suggestions of students, college partners or faculty members, a) identify a problem in an existing enterprise that prevents it from carrying out its business more effectively, or causes it some undesired expense; or b) identify an opportunity for the enterprise to sell an additional service or product to its existing customers.
2	Engage the enterprise, to understand this problem or opportunity intimately, from the viewpoint of its owner.
3	Conceive a cost-effective solution through discussion with the enterprise. Illustrate with a prototype if needed.
4	Make a business proposal, to seek financial backing.
5	Contract with the enterprise to deliver the solution.
6	Implement the solution and deploy it.

The key difference is – *sell before you build* – so that only what a client is paying for gets built. The college facilities and the available mentors are limited – and any stakeholders want to be sure these resources are marshalled to commercial value. Otherwise the participants lose motivation.

The first 4 steps may take several months to accomplish. But the process avoids the building of solutions to the wrong problem, or to a problem that turns out not to exist for the intended clients.

The project staging from conception to viable business can be summarized as follows:

- First meeting: review and screening of verbal proposals are done on request from any applicant to the programme. Accepted projects will proceed to:
- Stage 0: Project team formation and exploratory research, concluding with a business plan. No funding is offered to the entrepreneurs in the project team during this exploratory stage. As soon as a project team prepares its business proposal, its members can request a review by the Incubation Review Board.
- Stage 1: Business plan approved by the Incubation Review Board. Seed money is advanced to project team to work toward a contract with a lead customer, and an experienced business mentor begins working regularly with the group.
- Stage 2: For B2B projects, contract signed with first customer; for B2C projects, prototype built and agreement signed with any key supplier(s). The new start-up is

incorporated and additional funding advanced to the project team to work toward implementation.

- Stage 3: For B2B projects, the lead customer has implemented the new product or service and begun using it; for B2C projects, the new service has gone live – giving the start-up its first revenue. The business mentor continues with frequent coaching and some additional funding is advanced to the project team.
- Stage 4: For B2B projects, lead customer has formally reviewed the performance of the new product or service, and has declared it to be satisfactory; thus is ready to recommend the new product or service to other clients. For B2C projects, sales have increased steadily for 3 months and a high-confidence date is known for positive operational cash flow. At this point the start-up should have a sales funnel of additional clients and will be able to tap conventional funding sources.

As in the management of venture capital, incremental funding for each stage depends on passing the checkpoint at the end of the preceding stage, according to plan. Figure 2 summarizes the progress of a successful project from proposal to established, growing business.

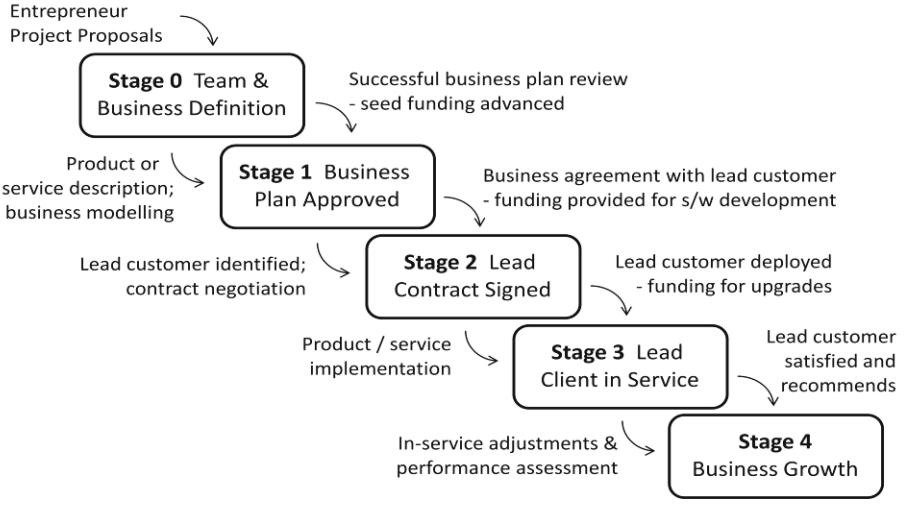

Fig. 2. Progress of a successful B2B incubation project. Below each box is the main work done in that stage; and to the right of each box is the event that enables promotion to the next stage.

The purposes of this process are (i) to provide frequent checkpoints for assessing the viability and progress of each start-up; and (ii) to weed out incipient failures early, so that the available funds can be focussed on those start-ups (and teams) most likely to repay investment. Originality of the entrepreneur's idea is not the key factor: success depends mainly on execution. *The process is more important than any particular business concept it incubates.*

In contrast to existing African venture capital firms and NGOs like Kiva.org and BidNetwork.org that target operational businesses needing cash for expansion [5], our investment focuses on the seeding and early-stage phases of their start-up businesses.

Ownership and management structure of the Software Business Incubation (SBI) programme are similar to that of venture capital firms, as in Figure 3 below. The investment funds are limited partnerships managed by the SBI Ventures firm. They are set up to manage groups of related start-up projects and capitalized with cash contributions from SBI Ventures, college partners, faculty members and other external investors. Their capital can be raised in repeated rounds. When an investment fund reaches its capacity of start-ups to manage, SBI Ventures may open a new fund. The investment funds pay SBI Ventures for facilities for their start-ups. Each fund doles out its capital by stages to its start-ups, like a venture capital fund.

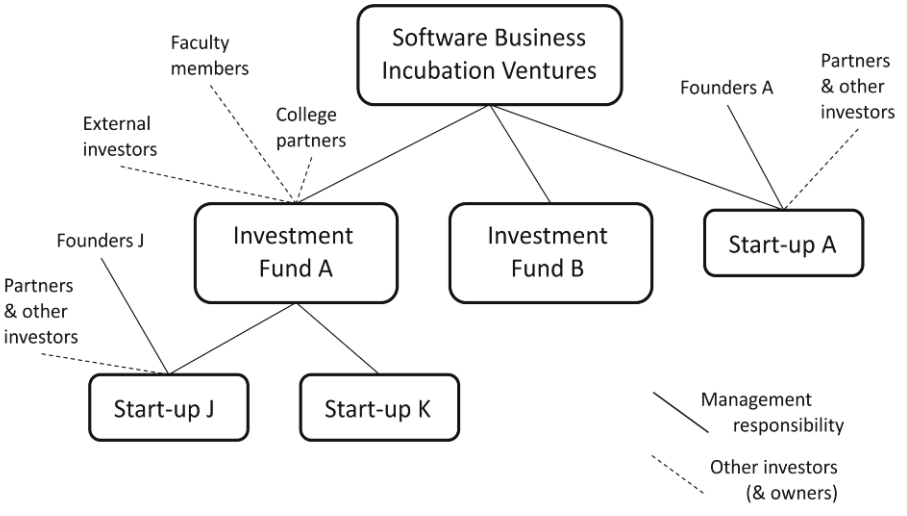

Fig. 3. Legal structure of the Software Business Incubation programme

The SBI Ventures management controls the allocation of resources: technical and business mentors, facilities, computers, software development environment and support, legal services, etc. Money from an SBI Ventures investment fund or directly from the SBI Ventures firm may be advanced to pay for these resources.

Following a successful business proposal review, college partners or other investors may also take a stake in the start-up by advancing funds to it.

When a project succeeds in contracting its first sale, the new start-up can be formally launched and incorporated. Its founders (the project team) receive a majority share of the new company; and SBI Ventures (or its investment fund) also takes a share representing its investment to date in the project plus the additional investment required to support the software development and implementation. The project team is paid a larger stipend from this time forward. Drawing on SBI Ventures' share in the start-ups to pay the founders helps cover their personal expenses and motivates

them. Alternatively, other investors in the start-up may raise their stake at this point, or may make a loan to the start-up.

The focus on software business opportunities is not only because the programme originated in an ICT faculty. Software and IT enterprises have long been the most fertile area for venture capitalists. Compared to other businesses, their start-up capital costs are also lower.

As a part of Makerere University, the College of Computing and IS offers several tangible assets of value to software start-ups:

- Office space, computers, network and communications infrastructure, software development environment and support for project teams
- An SMS service platform
- The OpenXdata applications platform (a tool set for structured data collection using mobile phones) and varied application experience with it
- Technical experts and programming coaches and for software development groups
- A constant and renewable supply of the country's top software development graduates (about 1200 per year)
- Ability to host web sites, SMS and database servers
- Some financial capital

To minimize the start-ups' requirement for cash, the college provides these assets as in-kind contributions to the start-ups' equity. Other contributions of expertise – for example in accounting, business modelling, financial planning, coaching in sales and operations management – are credited as in-kind equity contributions wherever this can reduce the need for cash. These other areas of expertise are all locally available.

The college's intangible assets are also valuable in the local Ugandan setting:

- Existing satisfied customers of past software development contracts
- Reputation of success in delivering software and IT services
- Connections with Uganda's political and business elite

The overall aim here, on a smaller scale, is to copy the American experience ("Close relations between universities and industry … with proliferating science parks, technology offices, business incubators and venture funds. About half of the start-ups in the [Silicon] Valley have their roots in the [Stanford] university." [6])

4 Discussion

The Ugandan setting constrains several of the success factors for business incubation, as noted in Table 1. Operationalising the SBI programme has involved mitigating or circumventing some of these challenges, as follows.

First, seed funding from within the university has been quite limited, and is also subject to the accounting rules for public institutions. The SBI programme therefore minimized its cash requirements by negotiating in-kind compensation for business mentors and other contributors; and diversified its funding sources through private placements and continuing applications to NGOs.

Second, the programme's cash flow is irregular and somewhat unpredictable – both for income and expenses. Given these vagaries, a separately managed account became necessary to shield the programme from other demands on college funds.

To fit the natural rhythm of the academic year, the main intake for the programme was moved to October, when final-year ICT students are choosing their major hands-on software projects. For the minority of students who prefer to pursue a project with commercial potential, this timing allows them to apply to the SBI programme with the same project. (As noted earlier, however, any aspiring individual or group of entrepreneurs can apply to the programme at any time.)

Table 1. Business Incubator success factors - comparison

Success factor	Typical university business incubator	High-performance business lab [7]	SBI-Makerere
Business opportunity focus	technology based service or product / licensing	solution for a problem or market failure	solution for a problem or market gap
Intellectual property focus	high	low	low
Business concept differentiation	technology	market segment, pricing, channel	end user cost, delay, pricing
Business model	required	required	required
Relative infrastructure costs	low-medium	low	medium-high
Founders' personal capital	wealthy, variable	wealthy, fairly equal	poor, unequal
Founders' education and business skills	medium-high	high	medium-low
"Soft" resource availability	medium	high	low-medium
Access to finance	medium-good	good	medium-poor
Assumed founder intensity	variable	full time	part time
Concept time to market	12-24 months	3-5 months	3-10 months

In the university setting, many would-be entrepreneurs lack business maturity and often have idealized preconceptions about mass market services, or desire to solve global problems. There is also a tendency (typical in university settings and not limited to Africa) to place excessive value on intellectual property and to focus more on technology than on barriers to uptake. All aspiring entrepreneurs in the programme hence attend a non-credit lecture series on business creation and management.

A related challenge is the lack of financial modelling experience among almost all of the start-up groups. Spreadsheet business models are a crucial tool for exploring product pricing options, determining criteria for profitability and building pro-forma financial statements. To date this has been addressed with individual group tutorials; but a more scalable approach involving visiting business-school interns is under way.

Even with the most sophisticated business models, accurate valuation of start-up businesses is virtually impossible. Hence the use of valuations to compensate start-up supporters like business mentors is unfeasible. To avoid such conundrums,

the equity shares of both the College and the business mentors in the start-ups are thus flat-rated.

The operating expenses for the SBI programme cover the following people's time:

- Programme management (2 faculty members part time): about $1,000 per month
- Software development environment, internet access and support for hosting (covered by the College)
- Review Board members (6 local business people, serving as volunteers)
- Business mentors (drawn from the local business community through contacts of Incubation Review Board members): in kind: flat rate 8% equity share in start-ups
- Technical mentors for software development (some volunteers from the College Department of Innovations and Software Development)
- Legal expenses for start-up incorporation, registration, contracts (paid at local market rates, with some pro bono assistance from a Canadian business law firm)
- Day-to-day administration (one college employee part time)

Total operational expenses can amount to as little as $2,000 per month plus about $2,500 per established start-up (from Stage 1 onward).

As such, the funds needed to run the SBI programme have been within the capacity of local investors for the small-scale pilot that was begun in the spring of 2010 and for its expansion in 2011. In absolute terms, they were significantly smaller than the 2009 foundation grant that equipped and launched the College's National Software Incubation Lab.

These numbers reflect the fact that there is some attrition at each stage in the SBI process; i.e. not all approved business plans get executed.

However, we are finding that over successive iterations of the SBI process to deal with operational challenges, the "yield" at each stage can be raised by continuous improvement of the SBI process, so that the portion of start-ups executing successfully and thus promoted to the next stage can rise over time.

In sum, by capitalizing on the existing features and dynamics of Ugandan society, this scheme creates some new positive feedback loops, as diagrammed in Figure 4 – and its investment of money and time can thus have disproportionate leverage.

As examples of this leverage, some of current start-up businesses in operation are:

- Sales/fulfilment and reporting system for booking and playing of radio adverts for radio stations and their clients.
- Web based skills-jobs matching service for job seekers and employers/recruiters
- Travel saving service for patients needing laboratory tests. (The innovation is in technology and channel to market.)
- Interactive SMS service for Makerere and other university results (plus additional information), similar to the secondary school national examination results service
- Targeted local-proximity marketing service for small-medium enterprises (that find traditional media unsuited for advertising their products).
- System for sports fans and other bettors to place bets and collect winnings from their mobile phones.

- Service to allow bus companies and their passengers to query, reserve and pay for intercity travel by mobile phone.

Notably, the role of new intellectual property in these solutions is negligible.

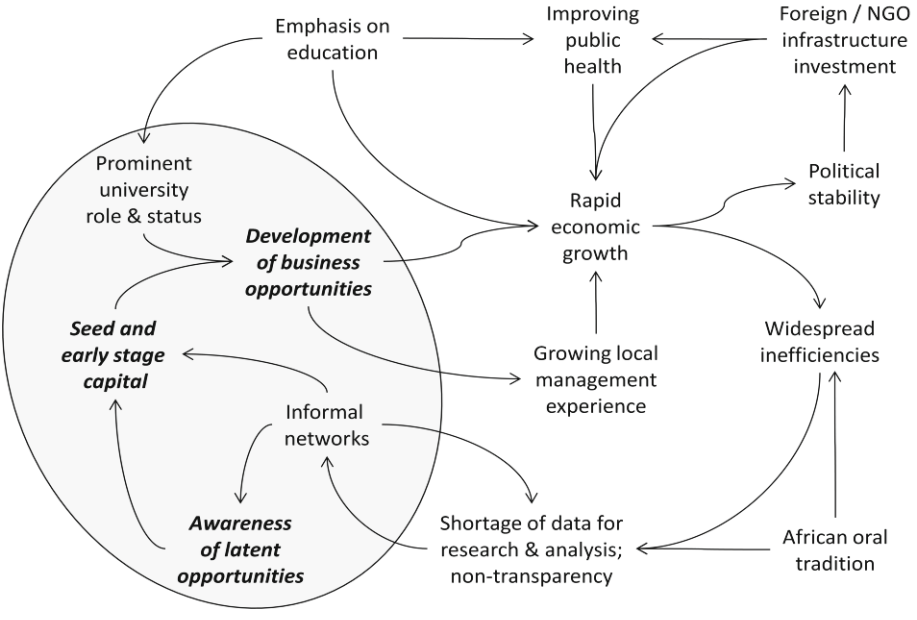

Fig. 4. Effect of new early stage venture funding and management in Uganda

5 Conclusion

This approach to software business incubation is a novelty in Africa. While aiming to emulate the role of universities in North America and Europe, it is adapted for the on-the-ground realities of Uganda's current society and economy, with all its constraints and opportunities. As such, it addresses a gap in current domestic investment and NGO activity in Uganda.

The Makerere University College of Computing and IS has developed this software business incubation programme as a part of its local mission; but in addition, the college would be delighted to collaborate through it with academic and professional partner organizations outside Uganda.

The cost of the SBI programme is small in comparison to foreign-funded education and public health programmes in Uganda, and its potential benefits are disproportionate. At minimum, the programme results in an annual human capacity creation of about 100 people with software venturing experience. At maximum, it will have a multiplier effect throughout the local economy and provide a handsome return for all the cash and in-kind investors involved. As a success, it can certainly be adapted for application in other African countries with similar local conditions.

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