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Building Capacity in Kenya's ICT Market Using Cross-Border Scrum Teams

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Abstract. This practitioner report outlines the nature of constraints to the development of ICT markets in Kenya, and identifies the cause of key market failures to grow domestic capacity. Results of an initiative to improve Kenyan ICT capacity through mentoring, international collaboration and the use of Agile project management methods are discussed. Based on findings from CodePamoja, a two-year collaboration between Dutch and Kenyan IT companies and the German government, the report explains how the use of cross-border Agile teams may align well to the objectives of those working in ICT4D.

Keywords: agile, scrum, cross-border teams, ICT4D

1 Introduction

Kenya is at the forefront of the drive to harness ICTs to transform African economies and societies. Almost two-thirds of Kenya's population has access to the Internet; the country has a well-established network of incubators and start-up spaces as well as a legacy of high-profile successes such as mobile money platform M-Pesa. Much of what has been achieved to date is the result of a tertiary education system that produces graduates with good technical skills, and high-level commitment to the sector from within the Kenyan government, whose stated goal is to make Kenya "Africa's most globally-respected knowledge economy" by 2017. Despite these ambitions, a number of structural constraints limit the ability of Kenya's ICT sector to develop in line with international best practice. As a result, Kenya's capacity to grow its ICT market remains limited.

Constraints are largely the result of a market structure which fails to involve domestic capacity in fulfilling large-scale ICT projects, thereby preventing knowledge transfer especially Soft Skills such as team-work and Project Management. CodePamoja is a project to overcome these constraints and catalyse sector growth by providing the opportunities for knowledge transfer missing in the Kenyan market. The project has been demonstrably successful.

1.1 Scale in Kenya's ICT market

The market for ICT services in Kenya is divided. One end of the market is driven by the needs of a small number of sizeable organisations requiring large-scale ICT services. Many ICT projects for organisations such as Safaricom and the Kenyan government have been too large and complex for local Kenyan companies to undertake. As a result these projects tend to be outsourced to partners typically in the USA or India [6]. This is at odds with the desire to award contracts to local Kenyan companies, and so an intermediate tier of Kenyan ICT companies has evolved to act as intermediaries between Kenyan customers and large international suppliers. Over time some of these companies have grown to be significant in terms of revenue and staff numbers, but still relatively weak in terms of the availability of technical skills. Effectively, the larger Kenyan ICT firms might be considered more as contract management firms and BPO facilitators than as pure-play ICT service providers. Outsourcing offers few opportunities for Kenyan staff to learn from more experienced peers, because work is undertaken overseas or by foreign staff working in Kenya for short periods and in isolation.

At the other end of the market are many small companies and “start-ups”. In developed markets start-up companies are generally formed by people who have gained business experience in larger firms. This is not the case in Kenya where start-ups are typically formed by young graduates, often as a vehicle for freelancing. The people involved usually have exceptional technical skills but lack the management skills required to build successful businesses. Unsurprisingly many companies fail, usually blaming lack of seed funding whereas lack of management experience is often the real issue. Some small companies succeed in growing to employ tens of staff but further growth is constrained by failings in management structure and lack of project management skills, resulting in the inability to undertake more complex work. Attempts to perform larger projects results in failure, reinforcing the view that Kenya's domestic ICT market lacks the capacity to undertake larger-scale projects.

Between the large outsourced projects and the smaller service companies a capability and capacity gap exists, as shown in Figure 1. Projects that fall in this gap are too small or low-budget to be outsourced, but too complex for local companies. As a result, many projects fail, or are not even contemplated. This is a critical problem for Kenya, especially given that many of the projects so constrained are in areas such as health and social improvement.

The outsourcing of large projects acts as a barrier to growth of the sector as a whole. Local firms lack contact with more experienced mentors and are unable to learn from involvement in larger projects. As a result a ceiling exists to their competence levels and they are effectively barred from participation in work at a higher level. This situation does not exist in developed markets where agile methods are used in large-scale development programmes [1]. For example, in the Netherlands a food-chain of subcontracting allows small companies and the staff who work for them to participate in larger projects alongside more experienced market actors, growing experience and capacity as they go.

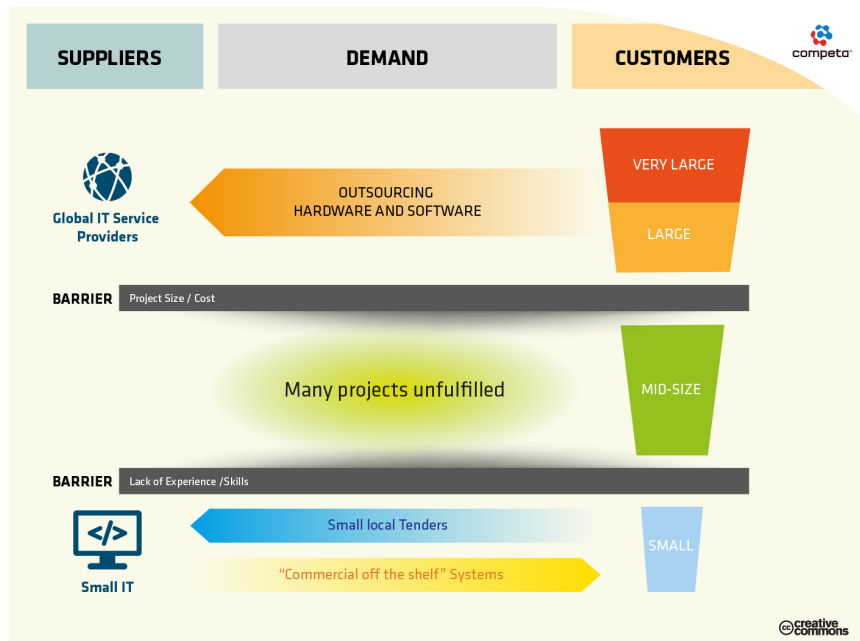


Fig. 1. IT Market in Kenya

1.2 Capacity building strategies

Kenya needs to grow the ability of the local ICT companies in line with international best practice, in order that companies with locally-specific knowledge and pricing can support other sectors of the Kenyan economy with ICT services.

To date, efforts to grow local capacity have focused on the development of training facilities and tech hubs. Reputationally, hubs have proved to be important in raising Kenya's profile and have proved attractive to global ICT companies and aid donors looking for social venture focused projects (see, for example, Omidyar's support for iHub [2]). Nevertheless, despite the reputational gains delivered by Kenya's tech hubs, growth of the sector is limited and the failure of the majority of ICT innovators to scale is a weakness in Kenya's ICT sector.

A Dutch/German/Kenyan initiative, CodePamoja ("CodeTogether" in Kiswahili) adopts an alternative approach, using international collaboration to provide the mentoring and knowledge transfer opportunities lacking in the Kenyan market. By giving Kenyan software developers the opportunity to work alongside Dutch professionals on real projects managed to international standards, CodePamoja provides the role-models and learning "food-chain" currently missing. Crucially, CodePamoja focuses on the use of Agile techniques such as Scrum to achieve results and deliver projects, rather than the purely technical aspects of ICT that have been the focus of many other training initiatives.

2 Methods

This is a practitioners report, based on first-hand experiences with the CodePamoja project over a two-year period from early 2015 to date. The report is substantiated with responses from more than 30 industry experts, policymakers and developers - in Kenya and internationally - who were interviewed and asked a range of questions about the Kenyan ICT market and how Kenya's potential in this key sector might be realised. These interviews were conducted as part of a study for the Dutch Government's Rijksdienst voor Ondernemend Nederland (Netherlands Enterprise Agency) internal report "Information & Communications Technologies in Kenya - A Market Study".

3 Evolution of the CodePamoja development model

3.1 Fair Trade Software

CodePamoja is a Fair Trade Software project. Fair Trade Software (FTS) is an economic model that aims to deliver high-quality and cost-effective software for corporate customers whilst simultaneously helping to grow knowledge economies in developing countries. By creating virtual teams with members in developing countries it is possible for software development services to meet Fair Trade criteria. Labelling software (such as corporate websites) produced in this manner with a Fair Trade label signals to end-users and consumers that societal needs are being addressed, adding value for all parties, as shown in Figure 2.

A detailed explanation of FTS is outside the scope of this report but a key point to note is that the model focuses on capacity building and growth of local capability more than simply providing work to people in low income countries, as in the case of off-shore outsourcing. FTS is an example of Shared Value Creation, defined by Porter and Kramer [7] as creating economic value in a way that also creates value for society. The number of companies and organisations currently adopting the FTS model is small but growing. FTS is developed by non-profit organisation the Fair Trade Software Foundation, and the model is under continuous development.

3.2 CodePamoja

CodePamoja is an initiative to give graduates in the Netherlands and Kenya work experience which builds upon academic qualifications and prepares them for a career as an IT professional at an international standard. Working in small cross-border teams led by experienced professionals, participants get hands-on experience in Agile project management (Scrum). Skills and techniques learnt at CodePamoja increase employment prospects of attendees in both the Netherlands and Kenya, and also help seed and catalyse the adoption of international best working practices amongst the Kenyan firms that hire people from the CodePamoja programme. CodePamoja focuses on Scrum because this has been



Fig. 2. Fair Trade Software Overview

identified as the area where expertise in Kenya is lacking. An international software development working-environment is replicated as closely as possible, with projects for real customers in the EU or Kenya. There is no fixed course syllabus, agenda or duration, participants work in small teams with members of varying skills and experience, and team members join or leave at random times as in a real company. Team members may be physically located in Nairobi, Kenya or The Hague, Netherlands. The first successful project to be completed at CodePamoja was a portal for foreign exchange students at The Hague University of Applied Sciences, which is now in operation. In its second year CodePamoja has begun work on a larger project to develop the Enterprise Kenya portal for the Kenyan ICT Authority.

CodePamoja is jointly funded by Dutch firm Competa and the Federal German Government develoPPP.de program. The project is run by Competa in conjunction with Kenyan partners BTI Millman and DewCIS. CodePamoja's funding under current arrangements runs out in June 2017 and the aim is to make CodePamoja self-sufficient within this timeframe. The project demonstrates the viability of co-development in virtual teams both as a commercial proposition and also as a mechanism for ICT4D.

4 Key findings and implications

To date, CodePamoja has provided work experience for around 100 people. During this time the way teams have been organised has evolved from multiple Scrum teams split geographically, to virtual teams spanning different geographical locations. The reasons for this are described below.

4.1 Learning Scrum - cross-border teams and culture

Based on experiences in the Netherlands it was anticipated that developers participating in CodePamoja would quickly learn the Agile mindset. This proved more difficult than expected for two reasons. Firstly, it was found to be almost impossible to teach Scrum academically and then build functioning teams from scratch - it is much easier for individuals to learn Scrum if they are immersed into existing fully-functioning teams. Secondly, there are cultural aspects that make Scrum difficult in Kenya. The Kenyan education system is highly competitive, with performance ranked individually. There are few team-based activities and people are encouraged to compete with other students. This culture of individual competition extends to society in general, making Scrum initially a rather alien way of working. It was observed that even when Agile ways of working were put in place, teams quickly fell back into Waterfall methods and non-Agile behaviour.

To overcome these problems CodePamoja implemented cross-border virtual teams, with at least one person from each location on every team. This proved highly effective in maintaining Agile behaviour, as more experienced Dutch team members acted as a check if Kenyan colleagues started to fall into Waterfall patterns of behaviour. Using Scrum in international projects is not unusual, but it is believed that cross-border virtual teams is a novel implementation as team members are usually in the same location.

Despite initial difficulties it was observed that once Kenyans become comfortable with team-based working they start to use Scrum to overcome cultural issues that can cause problems or barriers in the workplace. For example, it is culturally very difficult for Kenyan staff to ask management to address organisational problems such as lack of food facilities or non-performance of colleagues. However, within CodePamoja “the team” has been used as a way of separating complaint from individuals and presenting issues to management in a non-confrontational way, for example as an action point from a Scrum Retrospective.

4.2 Reputational gains and performance enhancement

Companies involved in CodePamoja have leveraged the experience to win substantial new business and conduct socially important projects. BTI Millman beat established vendors from other countries including South Africa and the UK to win a contract to develop a CRM system for Barclays Bank Kenya. The ability to demonstrate knowledge of Agile project management to international standards played a crucial role in winning the contract. The system was deployed

nationally with a user base of 900 members of staff in 120 branches. With the success of the Kenyan deployment, Barclays are planning to scale the application to the 9 other African markets. The impact of this project has been far-reaching for both Barclays and BTI Millman. Barclays are now able to provide a range of financial services to people who were previously unable to access such services. This results in a knock-on effect, benefitting other people and other economic sectors. Over the duration of the project BTI Millman has grown from 5 staff to 12 and tripled turnover. Thanks to improved reputation, the company has been invited to tender for other large projects and has attracted external investment.

DewCIS used experience gained through participation in CodePamoja to implement innovative and complex mobile health systems. Mobile implementation for Maternal, Newborn and Child Health (mPAMANECH) is a mobile app built for the African Population and Health Research Center. The app replaces numerous paper-based forms and allows integration of patient data from the community to health facilities for better referral and management of patients. The system has improved the reporting abilities of Community Health Volunteers (CHVs) and enhanced data quality with built-in data validation and verification. Following successful implementation the system was extended to include a decision support function, mobile Decision Support System (mDSS). Community Units are divisions for residents dwelling in the slum areas of Kamukunji Location, Nairobi County. Utilisation of the mDSS tool by the CHVs to screen expectant mothers and newborns improved the awareness of health danger signs by the CHVs, allowing them to provide advice or take action. The tool has also improved attendance of antenatal clinics by the mothers, leading to more deliveries in approved health facilities. The adoption of Scrum by DewCIS has resulted in a significant improvement in project delivery, and common problems with software development have been avoided. The company found that Scrum results in software that is properly tested and bug-fixed, giving projects a better chance of successful deployment and adoption. The company is now capable of executing more projects with significant local development impact.

4.3 Imitative behaviour and viral improvement

More than a third of CodePamoja “graduates” found employment as a result of participation in the initiative, and many report using the techniques learned in their new jobs, and teaching others. Whilst it was expected that developers would learn Agile techniques and use these in work with other companies, it was not expected that this would spread into management layers or customer organisations. However, when CodePamoja started work on Enterprise Kenya it quickly became apparent that the customer did not have a clear view of project requirements and so were unable to create User Stories for the project. This led to a member of the government staff joining one of the Scrum teams, rapidly learning Scrum and adopting an Agile approach to dealing with stakeholders internally in the government. This has encouraged the Kenyan government to use Agile methods more widely.

5 Conclusion & Implications for ICT4D

People employed in software development in developing countries lack role models and opportunities to learn industry best practice. This is particularly true of skills such as project management which are difficult to learn in a academic setting and are typically acquired by imitating more experienced colleagues. Lack of such opportunity seriously limits individuals personal ability, and the capacity of the organisations they work for.

There seem to be three conclusions to draw from CodePamoja. Firstly, whilst relocating experienced staff from locations such as the EU is neither practical nor cost-effective, significant advances can be made by creating virtual teams. This benefits people in developing countries who can build skills, and also those in developed countries who can be rewarded through cultural and social exchange.

Secondly, there is a good deal of agreement within the literature that what Haikin [4] refers to as the ‘widespread failure of ICT4D projects’ is the result of an over-reliance on top down, engineered’ approaches to delivery (see also, [3], [5], [8]). It is demonstrably possible to adopt an Agile approach to the management of such projects which can potentially reduce the rates and impacts of failure.

Finally, the collaborative approach of cross-border Agile enables international best practice to be embedded within local structures of decision-making. This can greatly benefit ICT4D projects, where often the greatest challenge is to maintain the scalability and sustainability of a project after delivery. The successes of BTI Millman and DewCIS demonstrate that foreign involvement and knowledge sharing opportunities, particularly in the area of Agile project management, can trigger local improvements that achieve significant development goals.

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