



# Creation, deployment, diffusion and export of Sub-Saharan Africa-originated information technology-related innovations



Nir Kshetri

Bryan School of Business and Economics, The University of North Carolina at Greensboro, Bryan Building, Room no. 368, PO Box 26165, Greensboro, NC 27402 6165, USA

## ARTICLE INFO

### Article history:

Received 19 April 2016

Received in revised form

15 September 2016

Accepted 22 September 2016

### Keywords:

Information technology-related

innovations

iCow

Large and small scale innovations

mPedigree

Sub-Saharan Africa

## ABSTRACT

A number of high profile innovations have been created in Sub-Saharan Africa. In this paper, we examine the mechanisms associated with the development, deployment, diffusion, and export of SSA-originated innovations. The paper gives special consideration to the relative roles and contributions of local and outside resources in the creation and deployment of innovations in SSA economies. A key focus of the article is on the roles of local infrastructural facilities, systems and services in affecting the diffusion of SSA-originated innovations. Also discussed are the features of SSA-originated innovations that explain the diffusion rates. It provides a detailed analysis and description of the key characteristics of SSA-originated innovations that can increase the possibility of being internationalized or exported to other countries. Finally, we analyze how such mechanisms vary across large and small scale innovations.

© 2016 Elsevier Ltd. All rights reserved.

## 1. Introduction

While most firms based in Sub-Saharan Africa (SSA) tend to be mere adopters of innovations, a number of high profile innovations have been created in these economies. Some SSA-based firms have been especially recognized as being the creators of innovations with high degree of adaptability to SSA-specific circumstances. For instance, the *Foreign Policy* magazine conducted a survey with the world's top Internet experts on Internet-related innovations. 7% of the experts viewed Africa as "the most innovative place for Internet-related technology". The corresponding proportions for other regions and economies were: Europe: 4%; China: 4%; India: 7%; and Pacific Rim: 5%. The experts viewed Africa's Internet-related innovations as: "On-the-ground solutions designed by communities for communities" (*Foreign Policy*, 2010).

There are also intriguing models of innovation deployment in SSA economies. For instance, consider the Ghanaian start up mPedigree, which uses mobile and web technologies to fight drug counterfeiting. To deal with the unpredictable and unreliable electricity supply in Ghana, mPedigree has located data centers on three continents. The company prints labels in China and India (Yeebo, 2015). SSA-originated innovations have also been exported to other countries. For instance, in 2010, EpiSurveyor, developed by

programmers in Kenya, which uses the cloud and mobile phones, was reported to have about 8000 users in over 170 countries ([mhealthinfo.org](http://mhealthinfo.org), 2010).

Before proceeding further, it is important to note that this study focuses on information technology related innovations. In this regard, prior research indicates that information infrastructures have economic, social (informal institutions) and political (formal institutions) dimensions (Bowker, 1996). However, prior researchers have not yet examined how economic, social and political factors affect the creation, deployment and exports of SSA-originated successful innovations. Also prior research has not studied the different features of an innovation that affect diffusion. It is also argued that an innovation's scale is important (Oosterhuis, 2006). Nonetheless, the literature has not adequately addressed the question of how the scale affects the ways innovations are created and deployed in SSA economies. Also, it is not clear whether SSA-originated innovations of different scales vary in terms of their potential to be exported and internationalized.

Viewing innovations as entrepreneurial activities, it can be argued that creation and deployment of innovations requires combining unconnected resources that reside in separated networks (Granovetter, 2005; Schumpeter, 1934). Prior research has not paid sufficient attention to the roles of resource flows across different networks in order for an innovation to be successful in the SSA context. Likewise, prior researchers have noted that industrialized world-based multinational corporations (MNCs) globalize their

E-mail address: [nbkshetr@uncg.edu](mailto:nbkshetr@uncg.edu)

innovations in order to exploit technologies in foreign locations. These MNCs also collaborate with public and private institutions in foreign countries and generate innovations (Archibugi & Michie, 1997; Iammarino & Michie, 1998). This has also been the case with SSA economies. What is not clear is the relative role and contribution of local inputs and foreign companies in the creation and implementation of innovations in SSA economies.

In light of the concerns raised above, this study examines the following research questions: RQ1) What are the relative roles and contributions of local inputs and support and resources from outside in the creation and deployment of innovations in SSA economies?; RQ2) What are the features of SSA-originated innovations that affect diffusion rates?; RQ3) What are the key characteristics of SSA-originated innovations that can increase the possibility being internationalized or exported to other countries?

We employ multiple case studies of SSA-originated innovations to address the above research questions. We develop propositions that serve as the basis for a general model of SSA-originated innovations to explain how such innovations are created, how they diffuse and what factors explain their exports.

Before proceeding, we offer some clarifying definitions. Small-scale innovations are innovations which affect only a given firm, industry, product or process and benefit a narrow group of consumers. Large scale innovations, on the other hand, have effects on complete socio-technical systems (Oosterhuis, 2006).

The paper is structured as follows. We proceed by first discussing the method employed in the paper. Next, we discuss case studies of representative SSA-originated innovations. Then, we develop theoretical propositions from the cases. It is followed by a section on discussion and implications. The final section provides concluding comments.

## 2. Method

The approach of this study can be described as theory building from multiple case studies, which is becoming increasingly popular in social science (Eisenhardt & Graebner, 2007; Kshetri, 2016). Compared to a single-case study, multiple-case studies are likely to provide a stronger base for theory building (Rowley, 2002; Yin, 1994).

Connection with related literatures, establishment of theoretical gap that exists in the literature, and explicit statement of research questions to address the gap are the key features of strong empirical research (Eisenhardt & Graebner, 2007). In qualitative research, it is also important to make a strong case for the importance of the research questions that have been raised (Bansal & Corley, 2012). We have established theoretical and practical importance of research on Africa-originated innovations.

There has been a good deal of debate on whether case research should be based on theory specified a priori or on grounded theory. Whyte (1984) argues that, to be valuable, research should be guided by "good ideas about how to focus the study and analyze those data" (p. 225). On the contrary, Glaser and Strauss (1967) suggested that evolution of a theory from the data is the basis for development of grounded theory rather than an imposition of a priori theory. Likewise, Van Maanen, Dabbs and Faulkner (1982, p. 16) suggested that investigators avoid prior commitment to any theory. In this study, we follow Whyte's approach. As such, we provide a theoretical framework related to factors driving innovations in SSA economies.

### 2.1. Selection of cases

Broadly speaking the selection of cases in multiple case study research has the same objectives as in random sampling. That is, the

**Table 1**

The cases selected and their classification in terms of incorporation of local inputs and scale.

Scale	deg. of incorporation of local inputs	
	High	Low
Large	M-Pesa	mPedigree
Small	EpiSurveyor Kilimo SalamaLulaiCow	biNU

cases should represent the population and there needs to be a useful variation on the dimensions of theoretical interest (Seawright & Gerring, 2008). A key difference is that in a multiple case study design, the choice of cases needs to be made more on a substantive rather than statistical basis in order to adequately represent a target population (Greene & David, 1984).

First, it is important to make it clear that case selection is also guided by pragmatic, logistical and financial reasons (Seawright & Gerring, 2008). We selected only cases for which we could obtain sufficient information from secondary resources. Eisenhardt (1989) suggested that about seven cases would be ideal for building theory. Following this recommendation, we selected seven cases. In order to select the cases, we combined two methods: extreme case method, and diverse case method (Seawright & Gerring, 2008). More specifically, the process started with extreme case method and morphed over time with implementation of different requirements and recommendations.

In the extreme case method, cases with extreme values on the independent (X) or dependent (Y) variable of interest are selected (Seawright & Gerring, 2008). The innovations selected in this paper are extreme in the sense that they are among the most successful in SSA economies. That is, we did not choose any unsuccessful or average African innovations. Seawright and Gerring (2008) suggest that if the researcher has some idea about additional factors that might have effect on Y (the outcome of interest), it would be better to pursue other case selection methods.

Following this recommendation, we utilize a diverse case method as a strategy to select specific cases of successful innovations with diverse characteristics originated in SSA economies. A key objective in this method is to achieve maximum variance along relevant dimensions (Seawright & Gerring, 2008). This method requires the selection of two or more cases to represent the full range of values characterizing X, Y, or some relationship between these variables (Seawright & Gerring, 2008).

As to the factors affecting Y, especially the incorporation of local inputs and resources emerged as a key driving factor for most of the successful innovations. Regarding this observation, the founder of the African Institution of Technology and Chairman of Fasmicro Group, Nduhuisi Ekekwe put the issue this way: "Building the AI [artificial intelligence] models for the African consumer cannot be optimally driven by Silicon Valley vendors; rather, African universities and research institutes who understand the nuances of being an African are better positioned for this task" (Ekekwe, 2016, para. 13). The role of this factor is under-appreciated in prior studies focusing innovations originated in developing countries.

In order to achieve diversity, we selected cases with different combinations of scale and incorporation of local inputs. It is also worth noting that the variables related to the importance of local inputs and scale are continuous. As suggested by Seawright and Gerring (2008) for such variables, we chose cases that represent the four different combinations of the levels of scale and importance of local inputs as shown in Table 1.

A further way to increase diversity would be to include cases that have various causal paths that link the related variables to a particular outcome. For instance, three different independent variables ( $X_1$ ,  $X_2$ , and  $X_3$ ) may have effect on Y, but they may do so independently and in different ways (Seawright & Gerring, 2008).

Download English Version:

<https://daneshyari.com/en/article/5110871>

Download Persian Version:

<https://daneshyari.com/article/5110871>

[Daneshyari.com](https://daneshyari.com)