

# INNOVATION RESEARCH SYMPOSIUM

# Conference proceedings

## **Third Nairobi Innovation week**

*"Innovating to solve pressing local and global challenges"*

7<sup>th</sup> March 2017  
University of Nairobi Towers



# Proceedings of the 1<sup>st</sup> Annual Innovation Research Symposium

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# Foreword

On behalf of the University of Nairobi and on my own behalf, it is my pleasure to the proceedings of the first Innovation Research Symposium that was held at the University of Nairobi during the Nairobi Innovation Week 2017. I was honoured to be at the symposium to listen to research paper presentation and engage in the research discourse. The University of Nairobi is a research intensive university with a reputation for excellence and a strong and vibrant research culture. It is our objective to ensure that our research, across all disciplines remains relevant by positively impacting the community and the region. As we all know, research is the backbone to development, providing solutions to societal problems through the transfer of knowledge and technologies, interactions and reflection, thereby improving community livelihoods.

The UoN Research Policy recognizes that the existing gaps that underlie the realization of development agenda cannot be adequately addressed without inputs of institutions of higher learning and research. As such the University of Nairobi in its strategic direction remains alive to the significance of research and how it impacts development, making conscious and deliberate efforts to achieve the same. At the national level, the Vision 2030 also recognises the role of research and development, science and technology and innovation in improving the economy and human development. These strategies can be achieved when there is a balance in the quality of research undertaken, prioritising societal problems, utilizing existing knowledge on the societal problems, availing financial capacity to address the problems and building and availing the necessary critical resources for utilisation.

Research and extension is therefore a function of the government as decision makers, the public as target population, industry as commercial partners and researchers as creators of the new knowledge. With this platform, the goal of high quality research underpinning knowledge creation and technology transfer is within our reach. Institutions of higher learning and research institutes working together with government working together can promote relevant research geared towards national development. It is essential that Higher Education Institutions position themselves to collaborate and share knowledge and innovation with governments and development agencies to impact positively on national development. The Innovation Research Symposium is one such avenue where the key stakeholders can come together and share knowledge and experiences. These proceedings, therefore, provide a permanent record of the presentations by the various researchers. We hope you find them useful, look forward to your participation in future symposia.

*Prof. Lucy Irungu*  
*Deputy Vice-Chancellor, Research, Production and Extension*  
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# Editors' Foreword

The world today is faced with complex challenges in the areas of health, education, technology, urbanization, environment, among many others. Such complexity calls for innovative solutions. Researchers are best placed to provide pathways towards innovative solutions by engaging in knowledge exchange. The Innovation Research Symposium offers a platform for multi-disciplinary knowledge exchange for researchers in the region. During the event, about 50 researchers from diverse backgrounds, discussed the importance of innovation in their different disciplines.

A befitting welcome address was given by Prof. Lucy Irungu, the Deputy Vice Chancellor of Research, Extension and Production (DVC-RPE) at the University of Nairobi. The DVC-RPE urged researchers to take the lead in solving the pressing local and global challenges, in keeping with the 2017 theme of Nairobi Innovation Week. The address was followed by a keynote speech on 'driving innovation through advanced research in Africa' delivered by Dr. David Moinina Sengeh of IBM Research – Africa.

The morning session of the symposium was a plenary discussion, in which researchers presented their work. Their presentations provoked lively discussions about the need for local solutions that take into account the global context of innovation; the researchers were challenged to consider how their proposed solutions can be replicated in other regions, given the shared challenges around the world.

The plenary discussion was followed by a more interactive, poster presentation session in the afternoon termed as the 'marketplace'. At the marketplace, researchers displayed their findings in the form of posters and exhibitions, with the audience going around the room to engage with each presenter. During this session, presenters had a chance to explain aspects of their work in detail, as the audience got to experience actual innovations.

The afternoon session culminated in the launch of the first 'Research cafe', in which a panel of eminent researchers presented their views on how innovation research can be advanced in the region. The panelists motivated the audience to discuss the challenges of carrying out and disseminating research, given the resource constraints faced by most academic institutions in the region. The 2017 Innovation Research Symposium is the first in a series of annual symposia, that will propel innovation research in the region.

*Prof. Madara Ogot and Dr. Amollo Ambole*  
*Co-Editors, 2017*



## Adaptive Business Model, Adaptive Policies

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### Abstract

This article intends to open a debate on the changes the start-up movement needs; both in terms of business models, methods of analysis and presentation, both in the solicitation of supporting policies the movement is asking. The question arises from an ambiguity and a breaking point: the ambiguity is the use of the term "startup", initially, until 15 years ago, reserved for new high-tech initiatives with a rapid growth and fast IPO exit; now the term is more extended and is used to stimulate self-employment projects following the Kauffmann report assessment: The breaking point is in the Global Change: the raising "economy 4.0" is a jobless economy where technology, the same as a startup should push, will offer a cost saving organizations with less and less need of human labor.

**Relevance to innovation.** Change in training young hopeful entrepreneur, driving them to self-employment through the creation of new business. Change in preparing them to conduct their businesses with much more flexible attitude than what has characterized the current global economic crisis. Two reflections at a glance: how to organize and present an "initial" business plan in future "liquid and flexible" economies, how to generate new support policies mixing technologies, social innovation, employment and regional development. The paper presents some indications to generate public program to boost business creation.

**Keywords:** Business creation, Development, Industry 4.0, Social Innovation, Start Up

### Introduction

Europe is where the "Startup Death Valley" grows without limits: a problem without an easy solution. On one side, we cannot tie the "Start Up" expression only to the advanced technologies, when the widespread economy of these countries needs to apply innovation in more traditional sectors. Differently, the U.S. economic structure allows rapid absorption of new high-tech initiatives in the corporate that often have even solicited these initiatives. Despite this, recent analyzes have revealed decreases in the birth of US new businesses, while traditional sectors are showing a growth.



Europe presents a severe gap with the possibility to attract investors, interested in high-tech and not patient enough to follow turnaround of local existing sectors, follower of rapid-growth initiatives more typical in the US start-up scenario; the absence of private investors leads European public policies to "force" the development of business creation, through financial support. Now without a relevant success: the result of this effort is a huge pushing of youth creativity, with no real experience in execution, no competence in company and risk management.

The goal of this paper is twofold. First to propose policies and suggestion to implement acceleration projects more suitable to local economies and their needs, to obtain an increment of the employment growth; even considering a global perspective, and even exploring advanced technology platforms. Second, to design training programs that will insist on developing execution skills, utilizing more flexible tools than traditional business plans. Leading entrepreneurs to use more effective and advanced methods of story-telling.

Now, unemployment figures in many European countries demonstrate that companies continue to evolve their organizations by reducing labor costs; start-ups are not building a real alternative: they seem to be more "unstructured moments of individual creativity" than business projects. (Citelli 2017)

## **Method**

The contents of the article are the result of a comparative analysis involving more than 300 start-up projects in the last four years, in various countries of South East Europe; the author has also worked as a scout for investments funds since 1999, participating the creation of several successes.

## **A new approach: creative business, if consistent**

Despite a huge spread of attentions to innovation and business creation process, changes in development of small and medium-sized enterprises in Europe do not show significant results; with a consequent inexistent impact on employment level. Small and Medium-sized Enterprises are often too small to have a real interest in "organic" innovation processes; consequently, they are losing competitiveness and pushed out of the market: a mortality that has reached excessive levels. In South and South East Europe, the SME system has been always represented as a driving force for stability and thus as a positive momentum in maintaining the levels of quality of life for many families; now the economic crisis is literally "killing" this segment of the European economy, presenting a problem that must be addressed.

Even if a marginal GDP growth is being measured in some countries, checked in microscopic percentage, this is the result of the application of financial models insisting in cost saving programs and then in "jobless" organizations; with negative impacts on the overall social economic development: the apparent growth is the result of companies offshoring and outsourcing with the main goal of labor cost reduction.

It should be remembered that 70% of new jobs in Europe is generated by new businesses, often "creative businesses". The "Real Economy System" includes SMEs with

a high number of employees (23 million SMEs in Europe - 75 million jobs). Therefore, the SMEs high rate of mortality implies loss of jobs and a total lack of attractiveness to potential new investors. To develop an "appropriate" start-up movement, even considering the limited employment levels at the beginning of the business process creation, can have a significant impact on the global innovation processes of SMEs in the region in which the movement acts, contributing to the construction of a virtuous ecosystem.

Its necessary to clarify the term "creative business": the expression has been generalized giving an extended meaning; not only "knowledge economy" businesses, but all the activities influenced by Web technology and sometime, even more generally, of innovation. As an example, in agrofood sector, the organization of a web business promotion of agricultural products, presented as "experiential and emotional tour", with links to the Mediterranean culture, to diet or to a health requirement (gluten-free, anti-diabetic, or otherwise), is a creative initiative applying new creativity to the promotion of traditional products and thus to the development of existing firms. The new enterprise drags in this case "old" ones with positive, synergistic effects. It is necessary for the new "agrofood" company just described, to have not a rigid revenue model, but a permanent tuning and an "on the road development"; transforming "early adopters" in a solid web success in terms of number of accesses leads to consider economic strategies mainly related with revenues from advertising.

But in the meantime, the initiative can release collateral products like the issue of a recipes book, with local traditional food companies as sponsors: this action will bring fast added revenues and a strong support to the brand penetration, which is essential for the consequent steps on the web.

## **From business plan to storytelling**

The processes of innovation in small and medium-sized enterprises in Europe do not present such significant results and successes as to influence the economic crisis affecting our Countries, especially regarding employment levels and thus spread of wealth.

It should be considered that both the processes of creation of new businesses and the processes of change and innovation in existing companies, especially SME's, have no indicators of success in Europe, and indeed new businesses and SMEs show a high rate of mortality; For many experimental initiatives, aimed at overcoming youth unemployment and then attempting to generate self-employment through entrepreneurship creation and development, there is no set of adequate, sustainable statistical achievements. This also applies to existing businesses, with traditional activities in crisis for the effects of globalization and increased competitiveness, i.e. businesses that fail to successfully integrate elements of innovation in their adjustment path. When innovation is perceived exclusively as "technological", the contribution of advanced platforms in the business model is often not correctly set and the result puts a strain on the business instead of helping it. A "formalized" business model is not very often a part of the managerial culture of SMEs; most of those, even if they are on the market since long time, have "intuitive" models, formed by experience and by traditional view of the entrepreneur. Moreover, regarding the so-called "startups", their business models follow, unfortunately

too often, the goal of "attracting" investors, presenting unrealistic financial metrics, and neglecting guidelines to conduct and to develop the company.

It follows that it is necessary to develop specific criteria for the business models of SMEs, especially if they tend to innovation and change, integrating their traditional business with new ideas or creating new ideas as start-up. A business model includes the terms in which the company defines: content (product or service), context (market), structure (organizational form), governance (external relations and partnerships), as referred to by the Call. It should be added that it is necessary to find an "adaptive" method to allow the company to "change the path of change", an apparent play on words that describes how the failures are the result of not only careless planning, but also of careful and very often too rigid one. Over the past two decades, the term business model has been largely employed in the extant literature. Specifically, a business model identifies how firms may create new value for customers and then convert payments received to profits (Teece, 2010). Thereby, to profit from innovation, entrepreneurs need to create not only valuable product and process innovations but also to design excellent business models, by fully understanding business design options as well as customer needs and technological trajectories. According Henry Chesbrough (2010), the father of the open innovation approach, a business model must fulfill the following requirements:

- to articulate the value proposition;
- to identify a market segment and specify the revenue generation mechanism;
- to define the structure of the value chain required to create and distribute the offering and complementary assets needed to support position in the chain;
- to detail the revenue mechanism(s) by which the firm will be paid for the offering;
- to estimate the cost structure and profit potential;
- to describe the position of the firm within the value network;
- to identify potential competitors;
- to formulate the competitive strategy for gaining competitive advantage.

In a recent study on business model, Zott and Amin (2010) have synthesized the above issues, arguing that the most relevant elements of a business model may be summarized into content, structure and governance. Content refers to the selection of activities, structure describes how the activities are linked (e.g., the sequencing between them), and it also captures their importance for the business model, and, finally, governance refers to who carries out the various activities.

The extensive adoption of the term business model seems to be in a certain sense intrinsically connected with technology-based companies. Indeed, business models seemed to be the answer for explaining how innovative undertakings are dealing with technology or any other form of unclear but potentially profitable concepts, foreign to the logic of traditional industries (Da Silva and Trkman, 2013). A key milestone in the proliferation of the terms use was the disruptive changes introduced by new technology, such as ICT and the Internet, which implied the emergence of novel business strategies and made the Industrial Age way of doing business as inadequate and obsolete (e.g., Venkatraman and Henderson, 1998).

From a theoretical perspective, multiple lenses have been applied to discuss the role of business model in the actual competitive scenario, as the cases of the resource based view (RBV) (Wernerfelt, 1984) and transaction cost economics (TCE) (Williamson, 1979). A

typical example of using the RBV to explain the business model term is presented in Hedman and Kalling (2003) where IKEAs business model is exposed through resources such as design skills, supplier relations, sourcing networks, and cultural factors like strong commitment and leadership. McIvor (2009) emphasized the importance of combining the RBV and the transaction cost economics (TCE) theories. As business value is created from unique combinations of resources, TCE identifies transaction efficiency as a source of value (Morris et al., 2005). Furthermore, business models have been also discussed in relation to the so called dynamic capabilities (Teece et al., 1997), since strategy shapes the development of capabilities that can alter current business models, and strategy is about building dynamic capabilities aimed at responding efficiently to future and existing contingencies (Ambrosini and Bowman, 2009).

A further question that has recently emerged in the literature regards how to innovate business models, in the attempt to design novel solutions more fitting with the current socio-economic scenario, as well as with the changed markets needs and expectations. Chesbrough (2006) has suggested the adoption of open business models, which create value by leveraging many more ideas, including external ones. To capture value these models rely on assets, resources, and positions not only in the company but also in other firms. In line with this idea, Zott and Amin (2010) established that, to develop new business models, actors must create novel systems including novelty, lock-in, complementarities, and efficiency (summarized by the acronym NICE), where:

- *novelty* is the adoption of new activities (content), and/or new ways of linking the activities (structure), and/or new ways of governing the activities (governance);
- *lock-in* represents their power to keep third parties attracted as business model participants;
- *complementarities* are present whenever bundling activities within a system provides more value than running activities separately;
- *efficiency* refers to how firms use their activity system to achieve greater efficiency through reducing transaction costs.

Finally, Teece (2010) has provided a sort of guideline for helping entrepreneurs in redesigning their business models. Specifically, questions to consider include:

- how does the product or service bring utility to the consumer? How is it likely to be used? As much as innovation requires the provision of complements, are the necessary complements already available to the consumer with the convenience and price that is desirable?
- what is the deep truth about what customers really value and how will the firms service/product offering satisfy those needs? What might the customer pay for receiving this value?
- how large is the market? Is the product/service honed to support a mass market?
- are there alternative offerings already in the market? How is the offering superior to them?
- where is the industry in its evolution? Has a dominant design emerged?
- what are the (contractual) structures needed to combine the activities that must be performed to deliver value to the consumer?
- what will it cost to provide the product/service? How will those costs behave as volume and other factors change?

- what is the nature of the appropriability regime?

However, despite this extensive interest towards business model, several issues still remain making this an interesting and promising research topic. Further investigations are needed to deepen our understanding on how individuals and firms may innovate their business models building and presentation, by creating novel business architectures more able to adapt to the emerging trends. Is storytelling a solution? Especially when the new initiative is dealing with emerging market and early adopter? Some considerations are now raising on the US scenario:

Clemson University entrepreneurship professor William B. Gartner believes business plans are essential. And the SBA notes on its website: "The importance of a comprehensive, thoughtful business plan cannot be over-emphasized." But lately, questions have arisen.

In 2006, William Bygrave, a professor emeritus at Babson College and longtime entrepreneurship researcher, studied several years' worth of Babson graduates to find out how much better those who started businesses with a formal, written plan did than those who didn't. "We can't find any difference," he admits. In other words, Bygrave and his team found that entrepreneurs who began with formal plans had no greater success than those who started without them...

So, what would Bygrave like to see instead of a business plan? Attempts to sell the product to actual customers, even if it doesn't exist yet. "Have you talked to a customer?" he asks. "If not, I don't want to talk to you about the business. (Mark Henricks, 2008)

## **Acceleration policies and business creation integrated approach**

New initiatives around business creation have multiplied their articulation with a waste of possible new definitions; incubators, co-working spaces, accelerators, start-up and start-up cup weekend, are just some of the new expressions that feed the mantra of startups as the key to a broader economic development. We must bring order and try to target consistent programs, especially public, with a clearly defined strategy, as the result of convincing analysis.

It is not possible to orient youth employment only towards the "conception" of new businesses: it is very important to give a strong training in risk management and a global entrepreneurial education; a major issue, in consideration that the "subjective individual entrepreneurship" is a strong feature whatever the role hired in an organization. Coherently, the incubation programs for young potential entrepreneurs should have a strong priority in giving "execution competences", basic to whichever entry in the working world.

Again, whatever it will be the aim of the new initiative, including social innovation, it will be essential to deal with "sustainable" development concepts; it will mean to think however in terms of "generation of value" and "cash flow". The main streams for any aspiring entrepreneurs is: how will I make profit? How should I attract investors?

A new initiative, with a significant social impact and a strong return in terms of "community growth", can be characterized by a low-slope growth curves and even so, attract investors: as per recent analysis, the 75% of "rapid growth start-up", although financed by venture capital, are not successful, while "slow & steady growth" new business can be attractive for clever investors, really interested in the social-economic challenge: the motivation of financial speculation in support of a start-up is permissible, but not required!

The introduction of a concept of "community" in a strategy to define development policies will enforce the goal to orient innovation and creativity of new businesses forward an interaction with existing traditional businesses, leading these in the necessary turnaround to get out from business crisis and reach a new economic success.

In recent years, there have been several attempts to enforce the dissemination of business innovation programs, both in terms of changes in traditional companies, both pushing the creation of new businesses. The main problem of all the undertaken programs in many of the observed countries, has been the lack of a vision of an integrated system. Trying an organic relationship between the creation of new initiatives and an integrated development of the economies and markets, is a key element in the definition of any supporting program.

Can accelerators and incubators be solution, even partial, for the building process of an integrated regional development strategy? Up to now, incubators and accelerators created by public programs can be considered "political experiments", not reaching the goal of an effective ecosystem and with ineffective results in the economic and social growth. An accelerator/incubator, being dedicated to reach relevant results in terms of cross-fertilization, should be a place where to meet different competences, management skills with R&D competences, universities and enterprises, all corroborated by appropriate financial resources and in the meantime attractive of new ones from new investors. The main goal is to present, even in a single physical and symbolic place, an efficient and effective ecosystem of innovative integration: a good way to use investments, but also to attract them: an incubator/accelerator can be an incisive place to symbolize the organizational capacity of a community and its development programs.

A "regional" acceleration strategy must be coherent with the economic and social specifications of local market: "glocal" is still a relevant expression to build a right mix of high-tech and local manufacturing. High-Tech industries are the most likely to show up, with a suitable growth curve, value such as to interest international investors. But it is not possible to neglect the competitive value of the growth of traditional sectors in a "local-but-potentially-global" economy, especially if the goal is to increase the employment level. An alternative to the jobless framework of the Industry 4.0 model.

## **Accelerator as a best practice**

A place where to concentrate innovative capacity and cross fertilization attitude, focusing the attention to significant New-Tech sectors for the territory on which the accelerator operates; new-tech as a neologism representing the innovative applications of even simple solutions to push local growth versus global competitiveness. A moment for representing

local skills and a backstage for investors attraction. An opportunity to push the creation of a "community venture capital", an alternative to the corporate venture capital generated by small local investors, engaged in developing their business with innovative solution. A contamination lab to disseminate innovation to SMEs and business culture to young people, a laboratory for the development of new models of economic sustainability.

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# Integration of the Open Government Data platform into Existing Content Management Systems in Kenya

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## Abstract

Open Government Data (OGD) avails statistical, development, expenditure and demographic data, in digital format for the general public, ICT developers, researchers and policy makers. This evaluation is based on analysis of qualitative and quantitative metadata and data sets in Open Data portals. The OGD platform integration to Content Management Systems, targeted internal and external users of Open Data portals in Kenya. The implementation of the OGD platform is facing a number of challenges resulting from the government ministries and county governments reluctance in releasing secretive information. To realize the benefits of OGD which includes transparency, public service improvement, innovation and economic value, efficiency, self-empowerment, impact measurement of policies, participatory governance, and data mining new knowledge from combined data sources and patterns from large datasets; the government needs to integrate OGDs in CMS. This paper analyses theoretical and empirical open data sets and proposes an integration framework of OGD to CMS.

**Relevance to innovation.** This paper analyses theoretical and empirical open data sets and proposes recommendations for future integration framework of Open Government Data strategies and Platforms as part of Content Management Systems. The paper outlines the benefits of OGD integration initiatives to CMS in Kenya. The innovation compliments government processes by introducing citizen-centered portals to enable government to design and distribute open data allowing interactions and seamless responses from the public. OGD is currently in use and can be scaled down to County Governments Open Data portals.

**Keywords:** Content Management System, Data Sets, Integration, Open Government Data, Metadata Portals



## **Introduction**

The Kenya Open Government Data Initiative was launched and relaunched in 2011 to enable increase access to government datasets(Mutuku and Mahihu, 2014). Governments and public institutions across the world collect, generate, store and disseminate broad range of data in order to perform their day to day tasks(Janssen, Charalabidis, and Zuiderwijk, 2012; Yunliang, Xiongtao, Qing, Jing, and Ning, 2010). This has led to the need of sharing public sector data and information, which is aimed at achieving public sector accountability, reduction of operational costs, efficiency in service delivery, quality of the services offered and innovations(Bertot, Jaeger, and Grimes, 2010).

Open government data relating to public services e.g. the waiting time of an office visit for the renewal of drivers license, is currently enabled in the Kenyan governments using the e-citizen content management systems(Nixon Kanali, 2015). The main aims of the OGDs initiatives is to make the government agencies more transparent participative and collaborative, encouraging pubic involvements in data collection, cleaning, analysis, presentation and application for economic growth(Parycek, Hachtl, and Ginner, 2014).

As per the Second Medium Term Plan 2013-2017, the government of Kenya has flagship project initiatives aimed at the development of local digital content including multimedia local content, e-government, e-learning, e-health care, e-commerce, e-marketing, and information and data gathering, retrieval, storage and communication (Government of Kenya, 2013).

The public has benefited from the implementation of OGDs through increased data transparency, accountability, increased awareness of government activities and programs resulting to public collaborations, innovations and creation of value-added services (Janssen and Estevez, 2013). In addition, this has improved decision making processes among the government officers and her citizen.

According to (Ubaldi, 2013) the availability and openness of the government databases accessed via web and mobile applications is expected to improve the quality of lives and the economy due to increased access to the government datasets when making choices.

Whereas there has been benefits in the implementation of OGDs, there still exists challenges which include; lack of harmonized data management system, inadequate information resource centers, limited penetration of telecommunication infrastructure in rural areas coupled with the digital divide between the rural and urban areas which limits public awareness of the advantages and opportunities of OGD (Darrel, 2015).

## **The State of OGD in Kenya**

### **Definition**

Open Government Data (OGD) is defined as datasets, selected by a governmental institution, which are structured and provided in a machine-readable format for machine-readability. (Sebastian Meumanier, Open Data Quality Assesment and Evaluation of (Meta-) Data Quality in the Open Data Landscape, n.d.). These datasets provide non-confidential and non-privacy restricted data, published in online catalogs accessible

through search engines and other data mining tools. Open Data in Kenya, can be found in the [opendata.go.ke](http://opendata.go.ke) portal of the Kenyan Government.

Content Management System (CMS) is a web application system that allows publishing, editing, and modifying of web-based workflow procedures and content as well as site maintenance from a central page (Burdon, 2009; Esperana and Pereira, 2016). (Eden, 2009) defines metadata as data about data, and can be expressed in three ways: embedded metadata that is contained in the markup of the resource itself, associated metadata maintained in files tightly coupled to the resources they describe, and third-party metadata maintained in a separate repository by an organization that may or may not have direct control over or access to the content of the resource.

## **OGD Development in Kenya**

[Opendata.go.ke](http://opendata.go.ke) portal was launched in 2011, becoming the first Open Government Data portal in Africa. The portal is accessible through mobile applications and third party web. Every Kenyan Citizen has the right to access state owned information as per the Article 35 of the Bill of Rights (Government of Kenya, 2013). During the launch of the [opendata.go.ke](http://opendata.go.ke) portal, there were over 200 datasets, later increasing to over 430 datasets in two years, with over 176,000 page views, and over 5500 datasets downloaded and embedded to several blogs and websites (Government of Kenya, 2013).

## **Method**

### **The study Design**

This paper is geared to evaluating the success and the barriers of OGD implementation and the need of integrating them to CMS. Several methods were involved including analysis of secondary literature of internationally published OGD publications. Different perspectives have been drawn stating the benefits, barriers, facts, myths of open data in aiding governments initiatives and innovations.

Document analysis has also been used to provide insight for government departments and bodies responsible for execution of the OGD policies. Operative documents which can be downloaded to statistically show datasets, APIs and their origins.

Additionally, empirical Quantitative and Qualitative Analysis of secondary datasets from Open Data Portals based on internal and external user access to OGDs and CMS has been used. The areas evaluated in this paper include; the status of OGDs implementation, the benefits and barriers of OGDs integration, and the proposed strategies that can be used to integrate OGDs to CMS.

### **Population and Sample**

The study is based on some government departments which include, e-government, e-learning, e-health and e-business. The data analyzed is from the open data portals datasets showing the importance of integrating OGDs with the existing CMS. Various

variables have been used to evaluate the government initiatives of allowing her citizens to freely access and distribute open data.

## **Discussion**

### **Status of OGD Implementation in Kenya**

#### **Legal framework and Policies**

Existing open data analyzed from the World Bank show that the population in Kenya currently stands at 46.1 Million with an annual population growth of 2.4%. Further 42% of the population are of the age 0-14, 55% are of the age 15-64 whereas only 3% of the population is of age 65 and above. The analysis shown that 30% of the population is aware of the legal and policy frameworks that exist to support the OGD usage whereas the bigger part of the population is not aware of the existence of the OGD supporting policies.

Numerous policy challenges are an obstacle to the success of OGD initiatives. The lack of clear policies pose a threat to data transparency, copyright issues and security restriction of the public in using the government data. Lack of guidelines, standards and procedures of how to create, validate, share and deal with the open data compromises the quality of the data available on OGD platforms. Over time the availability and accessibility of relevant OGD weakens in terms of format and content leading to low interest by the public in use of OGD, hence the need to improve the legal frameworks that will encourage the public to access and share the open data.

For example, the Kenya Institute of Curriculum Development has digitized content for classes 3 to 8 in science and mathematics for primary education in Kenya. Two frameworks exists namely the ICT for Education and the National ICT Innovation and Integration Centre which are involved in spearheading the pedagogical use of ICT and testing of technical solutions for use in curriculum development. There also exists an ICT integration model, which encompasses four pillars for effective implementation of ICT initiatives aimed at developing teacher capacity, development of relevant digital content, and rolling out of ICT infrastructure and robust policy and strategy. The aim these initiatives by the government is to increase access to quality digital educational materials, whereas the public is not fully informed of this state. It is important to have legal and policy frameworks and strategies that support OGD in conjunction with the CMS and ensure they are known and adopted by the citizens.

#### **Technical Issues**

Over 90% of government department have their services and process supported by ICT which results to a pool of knowledge that can be made open and freely accessed via the CMS. The analysis revealed less than 30% of the public is aware of the existence of OGD in Kenya hence government departments and agencies can be facilitated to carry out training to the public enhancing the awareness of existence of open government data. The government ICT and geographical information processing affiliated departments collects, stores and distributes the OGD GIS data. The CMS can establish links to

geo servers which store OGD metadata with the actual data sets. The open data is availed, accessed and reused in open and machine readable formats. This open data can be accessed and downloaded using any web browsers and search engines. The analysis revealed more than 60% of the departments that use modern and integrated ICT systems show readiness to share and publicize data as OGD. This also allows cross departmental exchange of e-government information supported by CMS. This enables departments to be autonomous in their decision-making process.

### **Economic and Financial**

A cost and benefit analysis show that the use of CMS to enable access of OGD results to reduced operational costs, increased efficiency, value added services, quality of life and economic growth. 70% of the analyzed financial reports shown that if the government adopts the use of integrated OGD to CMS it would result to accountability of government agencies to its citizen which will increase the investments and trust. World bank statistics analyzed from open data indicate that 19.3% of gross capital formation of the Kenyan financial status is aid depended from developed countries, while 12.4% of goods were imported in the year 2014. This information is available in the World Bank open data portal while missing in the Kenyan OGD portal.

### **Organizational Implementation**

The decision to implement OGDs as part of the existing CMS was proved to be more advantageous than standalone OGD platforms with more than 50% of the ICT department dataset showing that the availability of the digitized content from the existing CMS is available online, hence no extra training is required to enable the users access the open data due to previous knowledge of the use of CMS. More than 90% of the government e-services are supported by the CMS making it easy for government to provide, control and monitor access to government data.

### **Communication and Interaction**

The analysis indicated that 65% of the people who accessed OGD services proposed that there is need to develop an ecosystem where the public can be enlightened and educated on the importance of engaging and evaluating the government initiatives through OGD. The public will be enabled to engage with the wider community by sharing the feedback on relevance of the OGD datasets. These engagements will results to high public satisfaction and interaction through embedded platforms supported by the government CMS.

The government CMS promotes access to OGD even for the minorities and disabled. Over 50% of Public and private partnerships have actively encouraged innovation and enabled public participation in using OGD and improve policy making process. The OGD platforms have interfaces that when integrated with CMS will make it easier to access help functionalities and allow the users to give feedback. The review of the available datasets also shown that OGD can be supported by the social media platforms which will accelerate the access of the government data.

## **Benefits and Barriers of OGD Implementation**

The implementation of OGD has resulted to various political, economic and social benefits (Buzzi, Ferrucci, Gennai, and Petrucci, 2016; Janssen et al., 2012; Janssen and Estevez, 2013; Origlia, Cersosimo, Bianchi, and Fortunato, 2016; Weseni, Watson, and Anteneh, 2015) and the tangible benefits of the freely released government data certainly overshadows its challenges. Bertot et al states that scrutiny of the metadata show key benefit in value added services with easier access and increased number of the users that participate in the OGD (Bertot et al., 2010), increased transparency of public processes and administration leading to informed citizens who can engage in the monitoring, control and decision making processes, automated government administration processes which results to reduced administration costs and efforts, accountability by Government officers resulting to better quality of life and economy, and high productivity and economic growth enabling new innovations and creativity. OGD initiatives have increased collaborations and sharing of datasets among the public and private organizations increasing the user satisfaction and reducing the error reporting by users.

On the other hand the implementation of OGD has faced some challenges that include: Loss of income due to freely released data. Lack of knowledge about the existence of OGD by the public hence less usage. Other challenges featuring in the analysis are Policy, technical, legal, organizational, cultural, economic and financial challenges(Janssen et al., 2012).

The policies sometimes limit data transparency and copyrights of who owns the government data. This can restrict the publics right to use and distribute the government data. The public also may confuse the right to access information and the right to freedom of expression.

## **OGD Integration Strategies**

The citizen-centered portals is one of the strategy that can be used to enable government to design and distribute open data. A citizen-centered portal will allow interaction, seamless responses and accountability among the OGD stakeholders. The OGD frameworks can also be structured in a transparent way to enable government promote transparent services meeting the needs of its citizen. Flattening the organizational structures using the online portals that transform the processes from vertical forms where departments acts independently to horizontal forms where departments share common information. (Parycek et al., 2014)

Service Oriented Architecture (SOA) is another strategy that can be used to create OGD platforms that can be used to share government applications (Nasr, Gross, and van Deursen, 2010). The flexibility and power of SOA enables government to create and install new services across different departments and platforms. SOA enables integration of other systems to the OGD portals, since the use of SOA components reduces complexity of the system and increases reusability (Lee and Kwak, 2011; Nasr et al., 2010). Call for collaboration (CFC) is a strategy that the government can use to invite the individuals and private companies to submit proposals that can be used to develop and deploy OGD portals. Competition can be used to create awareness of the government e-services and

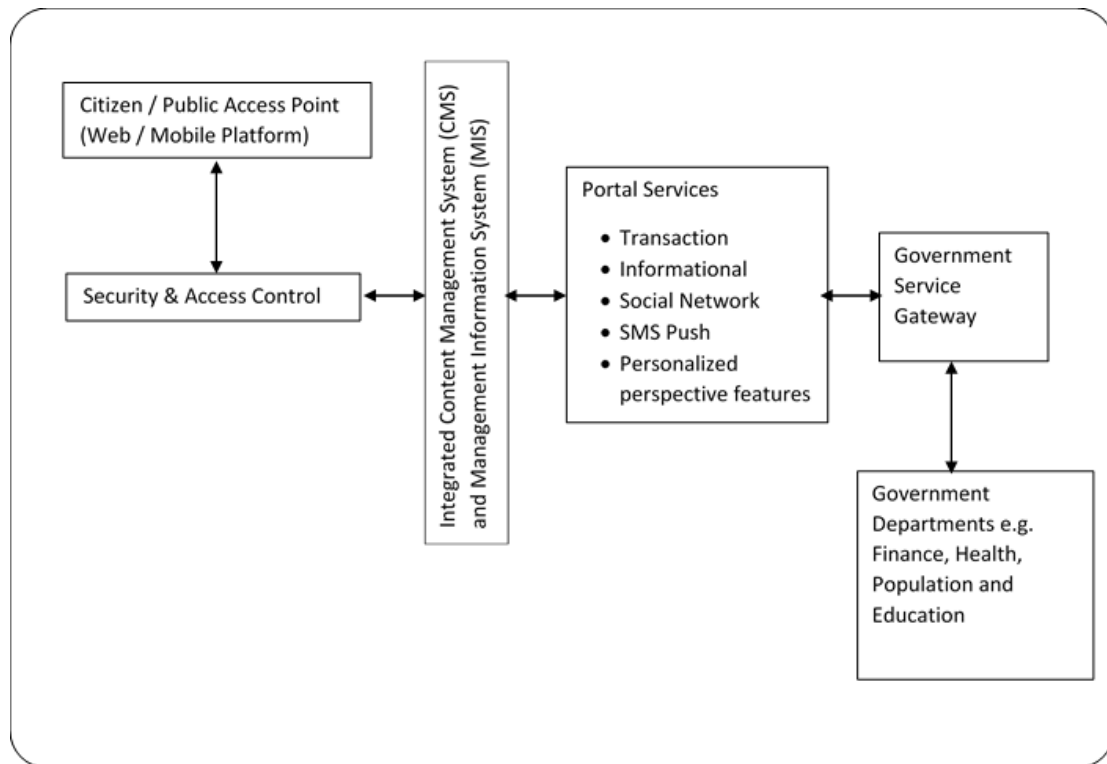


Figure 1: Proposed Framework for OGD Integration to CMS

the open datasets (Chan, 2013).

### Proposed OGD-CMS Integration Framework

An Analytical Framework for national OGD integration to CMSs supported by online portals and Government Initiatives has been proposed showing the success and barriers of the implementation.

#### Citizen/ Public Web and Mobile Platform

These web browsers and mobile platforms give the citizens an interface that they can use to interact with the government services. The platforms are citizen centered allowing the users to interact free with the OGD datasets.

#### Security and Access Control

This is the interface that allows the authentication of users enabling web based single-sign-on and standardized data encryption and digital certificates that can be used for audit trails.

## **Integrated Content Management Systems and MIS**

The OGD can be integrated with the government content management systems and MIS which are simply designed and have user friendly interfaces. The administrators interface allows Website content and OGD portal managers and other users to update content without much training in ICT, programming or other technical aspects of system maintenance.

## **Portal Services**

Portal services would include:

1. Transactional Services - This portal allows the public and the citizen to register, apply for birth and death certificates, driving license and issue other departmental services like online payments.
2. Informational Services - This portal provides the commonly shared information like public events, news and state departments information.
3. Social Network Services -This portal section facilitates the citizen to network and share messages during public discussions like committee boards meeting reports and bulletin. This allows citizens to participate in public interviews, surveys and other activities that will give feedback to the government agencies.

## **SMS Push Services**

This is used to send messages that is requested by the citizen and enhance public communication. This allows the citizen to be updated on what the government is doing including what services and activities are on progress. This results to transparency and accountability of all the stakeholders.

## **Personalized Perspective Features**

This enables the OGD portal users to have personalized pages according to the citizen requests. This encourages innovation and creativity of the users of the OGD datasets.

## **Conclusion**

The growth in publication of online data through the internet in the last few years has resulted to data explosion. The data produced by the public and the government is reused by citizens, government, researchers, media and other users. Integration of OGD to CMS is expected to result to benefits as discussed in the literature and verified by findings as discussed through the meta data portals analyzed. This study aimed at the existing state of OGD development in Kenya, status of OGD implementation in Kenya, benefits and challenges of OGD integration strategies.

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# SMS Enhanced Justice: Towards Efficiency and Convenience in Court Cases

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## Abstract

We seek to bring convenience and efficiency in the process of accessing justice through the courts of law. A lot of time and money is wasted when litigants travel long distances to visit court registries, in order to know the status of their cases. It is also very inconveniencing and frustrating for litigants when they travel for long, only to find that the judicial officer handling their case had given notice that there will not be any sitting on a particular date. In this project, we are developing an integrated solution to these challenges, dubbed FAMALIA. It is a web and SMS-based application that electronically manages the court cases by the Kenyan Judiciary. Litigants and interested parties can access the system via SMS. So far, details of over 28,000 cases have been entered into the system. It is expected that the system will greatly improve access to justice.

**Relevance to innovation.** Famalia is an innovative service within the judicial process in Kenya. It provides a new way of accessing case related information in a convenient, efficient and timely manner. It is a premier solution not only in Kenya but also in the region. By using SMS, Famalia provides social impact by being accessible to even the marginalized people who may not access the courts easily. It is accessible to anyone who can access a phone. With the judicial process being similar all over the country and in neighbouring countries, the solution is replicable and has potential for scaling.

**Keywords.** Access to Justice, Electronic Case Management System, Empowerment, FAMALIA, Justice Innovation

## Introduction

Access to justice is making inroads as an agenda in the mainstream development discourse. Sustainable development goal number 16 (Peace, Justice and Strong Institutions) aims to promote peaceful and inclusive societies for sustainable development; provide access

to justice for all; and build effective, accountable and inclusive institutions at all levels (United Nations, 2015). Closer home, Kenyas Vision 2030 contained strategic initiatives to strengthen its political pillar. The strategies included increasing service availability and access to justice; and encouraging public access to information and data (Government of Kenya, 2007)

## **Challenges faced by litigants in accessing justice**

During the lifetime of cases, litigants waste a lot of time and financial resources when they travel long distances to visit court registries, in order to find out the status of their cases. At the court registries, they have to endure long wait times before they get fully served because of inefficiencies in the manual registry processes.

It is very inconveniencing and frustrating for litigants to arrive at a court station only to find that the judicial officer is not sitting. This happens when a judicial officer gives notice that there will not be a court sitting on a particular day, yet, the notice does not get to the litigants in time. Normally, litigants only see such notices when they get to the court premises, this is after they have spared the whole day to attend the court sitting. Besides the inconvenience and frustration, there is wastage of financial resources spent on travel.

For one to transfer inherited property (land, vehicle or shares) from a deceaseds name to a beneficiarys name, a case must be filed before a court of law. Many people do not know the steps to be followed in such succession cases which form about 50 percent of all initiated cases. Ignorance of the steps to be followed in the succession process makes the beneficiaries to easily get swindled by court brokers and corrupt judiciary staff in the corridors of justice.

## **Judiciarys blueprints and ICT**

The Judiciary of Kenya has not successfully implemented the ICT related strategic objectives contained in its former strategic plans. In the year 2012, the judiciary came up with a blueprint for its transformation agenda titled Judiciary Transformation Framework 2012 - 2016, whose underlying philosophy was laying foundations for the transformation of the Kenyan Judiciary. The blueprint outlined four key pillars that were envisioned to spearhead the transformation drive. One of the pillars was Harnessing technology as an enabler of justice. Within this pillar, there was a strategic objective to adapt automation and e-systems in the judicial process with initiatives such as establishing a Comprehensive Case Management System (CCMS); developing citizen-friendly ICT portals and channels; and establishing SMS inquiry systems for litigants and the general public. (Judiciary of Kenya, 2012).

In the year 2016, there was a transition in the top leadership of the Judiciary. Come January 2017, the new Chief Justice of the Judiciary of Kenya, Hon. David Maraga also launched his strategic blueprint titled Sustaining Judiciary Transformation (SJT): A Service Delivery Agenda, 2017-2021. The roadmap has an underlying philosophy of transitioning from institutional capacity building to service delivery.

Among the strategic objectives outlined in the new blueprint is the development of Judiciary Operations Support Systems which will include registry and case management, calendaring and citizen-centric communication. The systems are envisioned to cover everything outside the courtroom that supports the delivery of justice. Despite the strategic objective on ICT having not been met in the initial blueprint, its inclusion in both strategic plans is evidence of the importance of ICT in access to justice.

## **Motivation**

According to the State of the Judiciary and Administration of Justice Annual Reports (2011/2012; 2012/2013; 2013/2014; 2014/2015) and the Judiciary Case Audit Report, averagely, 25,000 new succession and land related cases are registered annually. 75,000 remain pending in court annually. If a breadwinner who has property (land, vehicles or shares) dies, the beneficiaries must file a case in court before they can transfer the property from the name of the deceased. The court process must be followed even if the deceased had written a will, and the property is still in their name.

Succession and land related cases form about half of all registered cases in Kenya. This inspired the initial inclination of the proposed solution to be towards succession cases. However, since other types of cases are equally important, the scope was increased to cover all cases. Our proposed solution is called FAMALIA, coined from two Swahili words Familia Swahili word meaning family and Mali Swahili word meaning property.

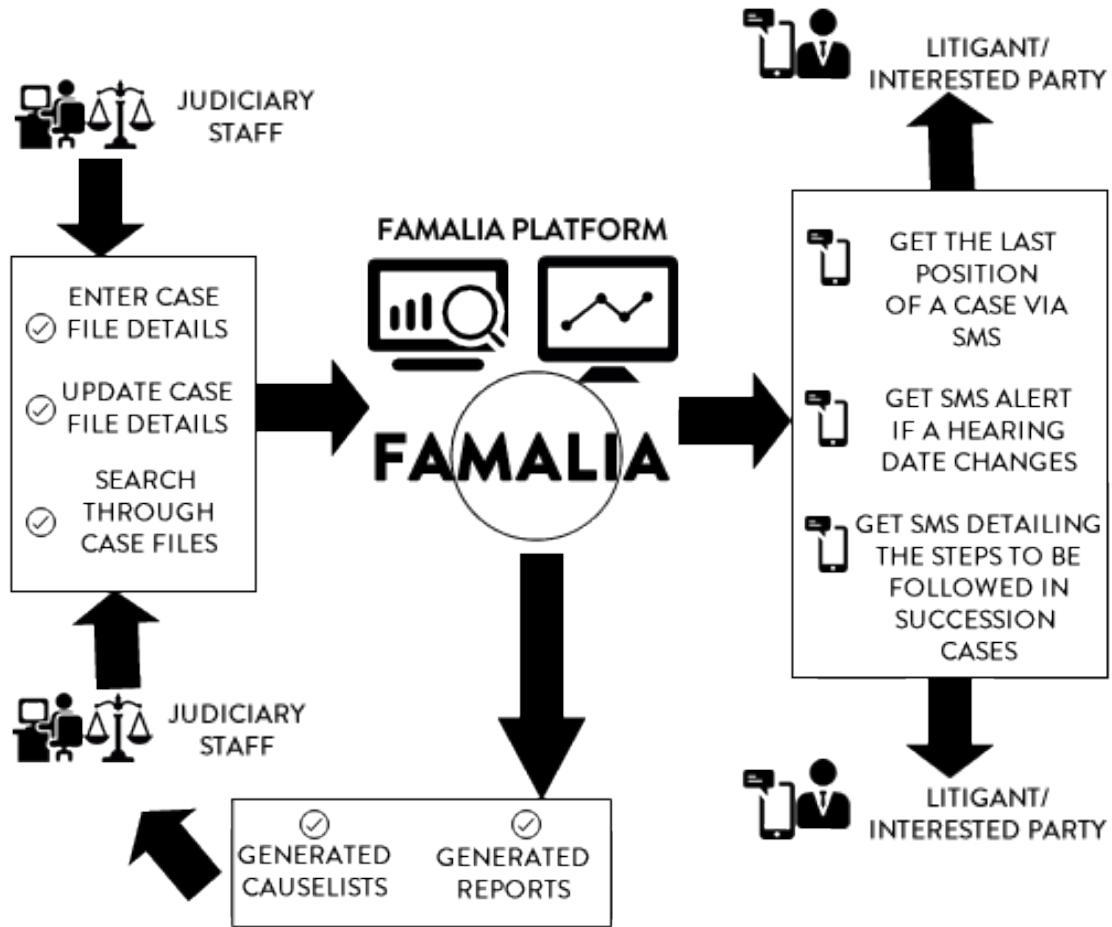
According to the Spring 2015 Global Attitudes Survey, 26 percent of Kenyans own a smart phone and another 56 percent own just a basic feature phone. This informed our decision to design the system to be SMS based. Famalia will have greater social impact by being accessible to all the 82 percent of Kenyans, something that even a mobile app will not achieve. All one needs to access Famalia is just any mobile phone.

## **System overview**

Famalia is an integrated web and SMS-based application that empowers people with information on court cases, both within and outside the judiciary. It seeks to be available to all people in Kenya with a mobile phone irrespective of the network affiliation. It however targets people who have court cases in the Kenyan courts or are interested in the happenings of specific cases in the Kenyan courts. Famalia not only aims to be citizen-centric but also judiciary-centric. Figure 1 depicts how the Famalia system works.

### **Citizen- centric features**

The system allows people to subscribe and follow the happenings of specific cases. Once subscribed, a person will get SMS notification alerts when the position of the case changes, for example, when a hearing or a mention date is set. SMS notification alerts are also sent when a judicial officer (a judge, magistrate or kadhi) gives notice that he/she will not sit on a specific date. This will prevent the subscribed user from unnecessary travel to the court premises, thus saving time and money. This also eliminates the frustration



**Figure 1. How Famalia system works**

that one would have if they would have traveled to court, only to find the judicial officer absent. Ultimately, this improves the user experience of the subscribed user.

The system also allows any member of the public to get the last position/ current status of any case file. By sending the number of the case file to a specified short code, the person will receive an SMS feedback stating the last position/ current status of the file (the date when the case last came to court; for what reason it had come before a judicial officer; the outcome from the court sitting). Many people travel long distances to court registries to only get this piece of information. The system will therefore deliver this information to them conveniently via SMS. Aside from the convenience, this will potentially save the user time and money spent during the court registry visits.

If a person wants to know the steps to be followed especially in succession cases, he/she will send a keyword to a specified short code. The system will then send a series of curated SMSs to the persons phone, detailing the whole process (The requirements needed before filing a succession case, the forms that are to be filed, where the forms are to be found, and the duration each step takes, the office responsible for each step and

the charged fees for each step). Empowered with such information, it is difficult for the person to get swindled in the corridors of justice.

### **Judiciary- centric features**

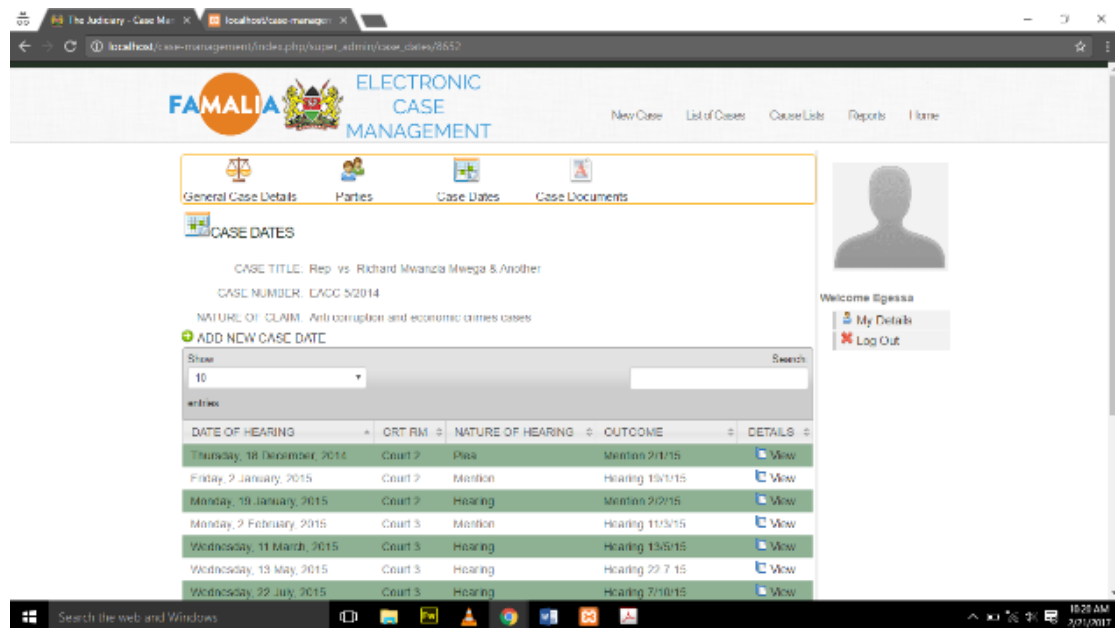
Before the system becomes beneficial to the citizens, information contained in the manual paper-based files needs to be entered into the system. This will not only be valuable to the general public but will be of great importance to the judiciary. Once a new case is filed at the court registries, the basic details of the case are entered into the system, for example, the case number, the date of filing, the type of case, the parties involved and their contact details.

When a case is assigned a date of hearing or mention at the registry, the details are also entered into the system (the courtroom where the case will be heard from, the judicial officer who will hear the case, the action the case will be coming to court for and the date when the case will be coming to court). This process automatically generates a causelist. This is a list of cases that are coming before a specific judicial officer on a particular day. This is a departure from the current procedure where the cases are normally manually typed time and again on a word processor.

When a case comes from court after a hearing or a mention, the outcome from court is entered into the system. The details include the date when the case is coming next before a judicial officer, the reasons for adjournment if any, the number of witnesses who testified in court and the outcome for the court sitting for that day. This will also automatically add the case to the causelist of the date when the next activity happens on the case.

The system provides a search mechanism for all the cases. A court registry staff will determine the position of any case within the court station in a matter of minutes. This is a great shift from the manual system which could take up to several hours in some cases. This system provides a single reference point of truth regarding court case details. The system also provides detailed reports for the management team, reports that were difficult to generate using the manual system. Statistics about the case loads per judicial officer, the average time taken to dispose cases, the case clearance rates, and the amount of backlog in a court station. Some of these reports will act as trigger points for the judicial officers to improve on their performance in terms of the number of cases handled.

The system provides a bring-up mechanism to alert the management team of the cases which have not had any activity for long or those that have not been assigned any hearing dates. This ensures that the case backlog is eliminated and idle cases are dismissed. It also ensures that justice is served faster, especially to the appeal cases. Most appeal cases fail to start immediately because the case file from the trial court has to be transferred to the high court. The weak manual systems normally create room for oversight in the process of requesting for the manual case files from the trial courts. The bring-up mechanism creates an automatic reminder to the management team in the event that a trial case file is not availed in time for appeal cases. The judiciary-centric features are expected to increase efficiencies in the registry processes and in the management of cases. Litigants who normally visit court registries to only check the status of their cases will be served much faster. Generation of causerlists will also be automatically handled.



**Figure 2. A display of the history of a particular case (when it came to court and what the outcomes were)**

The bring-up mechanism will ensure that dormant cases are activated or dismissed. This will reduce the case backlog within the judicial system. It will also cure the human forgetfulness that is experienced when trial case files are not transferred to the high courts in time for the appeal process to commence. With constant reminders being sent to magistrate courts for transfer of files, accused people in prison with appeal cases will have justice served to them in a timely manner.

## **Current status/ preliminary results**

Famalia Limited has entered into partnerships with Machakos Law Courts and Kiambu Law Courts to run the pilot of the project. Using Human Centered Design Approach, some of the judiciary-centric features were the first to be incorporated into the minimum viable product (MVP). The MVP has been deployed at both Machakos and Kiambu Law Courts. In Machakos, basic details of over 27,400 cases have been entered into the system so far. In Kiambu, the number of cases entered into the system is over 750. Machakos court has a larger number of cases in the system because they had kept some of the case details in electronic format. It was therefore a lot easier to convert the data into the new system. On the other hand, Kiambu High Court also has a lower number of cases because it was only launched in June 2016. Trial development tests have already started on the citizen-centric features of the system. This has only been made possible after the data entry on the judiciary-centric end of the system. Sample Screenshot are shown in Figures 1-5.

NO	COURT ROOM	CASE NO.	TITLE	TYPE OF HEARING
1	HIGH COURT 1	HCCR10/2012	REPUBLIC VS. DOMINIC WAMBIA VAITA	HEARING
2	HIGH COURT 1	HCCRM15110/2015	MUMO MUILANDI ALIAS KAMOMO VS. REPUBLIC	MENTION
3	HIGH COURT 1	HCCR21/2015	REPUBLIC VS. ALEX MUIHUKU ISIKA	PLEA
4	HIGH COURT 1	HCCR20/2012	REPUBLIC VS. ROBERT NACHOI	MENTION
5	HIGH COURT 1	HCCR50/2015	REPUBLIC VS. TIMOTHY NDOLO NGULU	MENTION
6	HIGH COURT 1	HCCR75/2015	REPUBLIC VS. PATRICK KIOKO MBONDO	HEARING
7	HIGH COURT 1	HCCR1/2014	REP -VS- PETER MUTINDA MUTISO	MENTION
8	HIGH COURT 1	HCCR//2015	REP VS. BONIFACE MBURU GATUGITA & IFRESIA MUKULU CHOVE	MENTION
9	HIGH COURT 1	HCCR79/2015	REPUBLIC VS. JACKLINE NTHENYA LIHURU & JOHN WAMBIA MUNYAO	MENTION

Figure 3. A display of the causelist

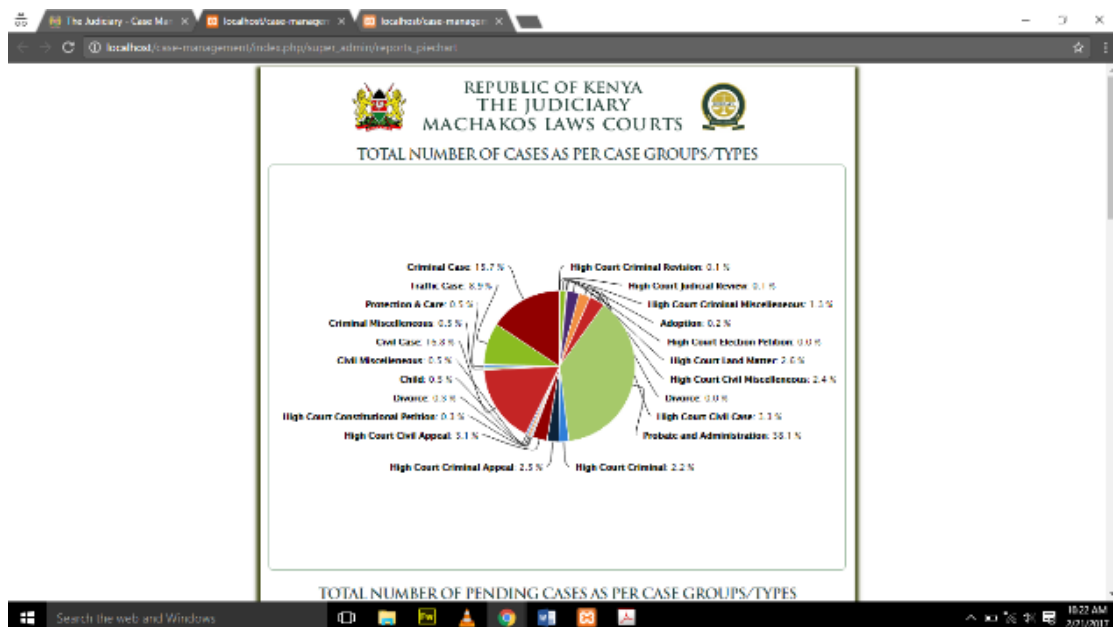


Figure 4. A sample report for the management





**Figure 5. Sample SMS messages to interested parties in a case**

## **Conclusion**

Given that it has only been slightly over a month since the pilot began, there has been tremendous learning of the processes within the Judiciary. The development process has been majorly iterative while placing the user at the center of the design. The convenience to the public that is expected to be brought by the system and the improved efficiency in the court registry processes will greatly improve access to justice. It will also improve the experience of court users in their justice journeys.

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# Promoting Job Creation and Economic Growth Through Entrepreneurship and Innovation in South Africa

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## Abstract

South Africa like currently faces pressing challenges owing to the absence of sustained economic growth and job creation. As a developing economy, entrepreneurship and innovation are vital to job creation, unlocking growth and enhancing overall productivity. The government has thus prioritized entrepreneurship and the advancement of small, medium and micro-sized enterprises (SMMEs) as the catalyst to achieving economic growth and job creation. The Department of Trade and Industry (DTI) is taking the lead in implementing SMME-related policies, to achieve the above objective. This paper discusses the current status quo of job creation, economic growth and development in South Africa, as well as the challenges to innovation and Entrepreneurship. It reviews government policies and programs as well as emerging trends in entrepreneurship and innovation being put in place. The paper concludes with recommendations and the way forward for South Africa to promoting job creation and economic growth through entrepreneurship and innovation.

**Relevance to innovation** This paper addresses a pertinent issue of the challenges to innovation and entrepreneurship in South Africa, by clearly elucidating the need for government to understand the current status, challenges and to enunciate rational solutions that can lead to innovation, economic growth and job creation. It is more of a position paper that highlights the necessity for innovative approach to addressing the challenges to innovation and entrepreneurship in South Africa and indeed other countries in Sub-Saharan Africa. Attending to the issues raised in this paper will have significant impact in the improvement of life in Sub-Saharan Africa especially amongst the youth.

**Keywords** Entrepreneurship, Growth, Innovation, Job, Venture

## **Introduction**

The most pressing challenges facing South Africa today is the absence of sustained economic growth and job creation, which are essential to reducing poverty and improving living conditions (Kumo, Rielnder & Omilola, 2014). Latest figures released by the International Jobs Report, as published by the IMF, the EIU, and the OCP Policy Center reveal that South Africa's unemployment has hit 25.2% for 2014 one of the highest in the world (Abruzzese, 2015). The report also suggests that job creation and economic growth go hand in hand; hence, raising growth through supportive macroeconomic policies and structural reforms are needed to raise employment growth so that the unemployed and new entrants to the labor force have jobs.

For a developing economy like South Africa, entrepreneurship and innovation are vital to job creation, unlocking growth and enhancing overall productivity at both the national and the global levels. It is against this background that the South African government has prioritized entrepreneurship and the advancement of the small, medium and micro-sized enterprises (SMMEs) as the catalyst to achieving economic growth and job creation. Nonetheless, researchers emphasize that the key variables distinguishing the entrepreneurial venture from a small business are innovation, potential growth and strategic objectives (Venter & Rwigema, 2008). Similarly, (Mafemba, 2013) argues that entrepreneurial ventures are usually driven by significant innovation to build sustainable businesses. Importantly, innovation may be in the product or service itself, or in the business processes used to deliver that product or service. The small business, on the other hand, often calls for very little innovation as it is usually involved in established markets, products or services. Drawing from these views, it may be concluded that entrepreneurs would show more innovation than small business owners.

With the assistance of various government departments and institutions, the Department of Trade and Industry (DTI) through its endeavors to facilitate the country's economic growth, wealth and job creation, takes the lead in implementing SMME-related policies, to ensure that adequate financial and non-financial assistance is provided to the sector, for its long-term prosperity and that of the country in its entirety. Some of these policies include the National Youth Economic Empowerment Strategy and Implementation Framework (NYEESIF) for 2009-2019 (South Africa. DTI, 2009). DTI's key objectives here are to improve the quantity and quality of youth entrepreneurship and technical knowledge, reduce poverty and unemployment among young people (South Africa. DTI, 2009).

## **Current Status of Job Creation and Economic Growth and Development in South Africa**

The economic woes of South Africa continue to increase at an alarming rate with unemployment posing significant challenges as it has reached 25.1%, and youth unemployment hit 36.1% at the end of 2014 (Statistics South Africa, 2015).

In its latest World Employment and Social Outlook report, the International Labour Organisation (2015) says youth unemployment (youth aged 15-24) in South Africa is

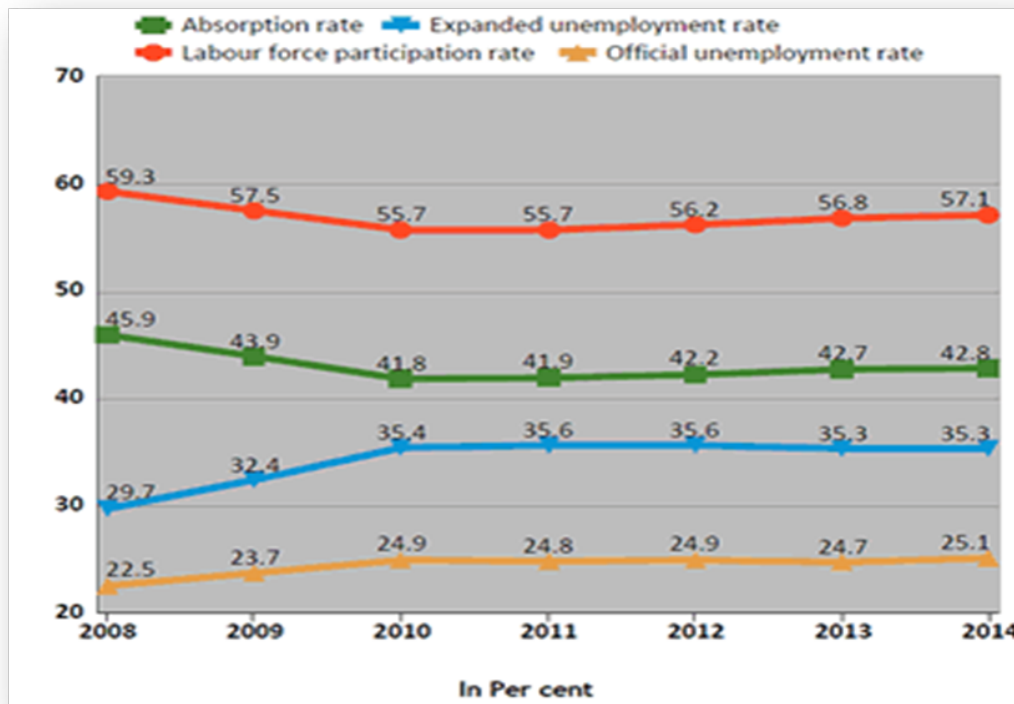


Figure 1: South Africa change in total unemployment, 2008 2014

52% which is more than four times the figure for sub-Saharan Africa. However, Statistics South Africa's latest labour market report categorizes youth as people between the ages of 15 and 34 or working-age youth, and puts youth unemployment at 36.1% for 2014. Data from the same report reveals that youth unemployment between 2008 and the first quarter of 2015 has deteriorated and more young people have abandoned their job-seeking efforts. (Statistics South Africa, 2015).

The official data from Statistics South Africa reveals that the limitations of the education system in South Africa had a big impact on youth employment prospects. Another contributing factor to the alarming youth unemployment figures, and unemployment overall, is the jobless growth occurring in South Africa's economy. As the national economy now creates fewer and fewer jobs and top-down government job creation initiatives have proven ineffective, policies geared towards bolstering youth employment through alternative means are essential. (Banerjee et al, 2008) believe that the reasons for South Africa's inability to create job opportunities to meet the growing demand are due to persistent lack of entrepreneurial culture country-wide and that the informal sector of the economy is unable to expand as expected to provide employment opportunities.

Youth job creation will require a mix of policy tools and levers to create opportunities for this demographic and take advantage of new and neglected markets. Given how the trend in youth unemployment intersects with jobless economic growth in South Africa,

	2008	2009	2010	2011	2012	2013	2014	2015
	<b>Per cent</b>							
Western Cape	25,9	27,4	27,6	32,1	31,6	33,2	31,0	29,9
Eastern Cape	37,6	39,2	40,3	37,0	38,1	39,8	40,7	41,0
Northern Cape	33,8	38,4	39,3	41,5	36,2	40,4	42,4	45,1
Free State	34,9	36,1	40,5	39,7	44,4	43,4	48,2	39,4
KwaZulu-Natal	30,5	32,1	27,1	29,7	29,8	30,5	30,5	33,4
North West	30,9	38,2	37,3	38,2	41,1	38,0	38,4	39,7
Gauteng	32,4	31,6	39,1	39,3	36,9	37,7	36,4	39,8
Mpumalanga	32,9	36,0	41,1	42,9	42,5	40,5	42,8	38,8
Limpopo	43,5	40,5	39,2	28,3	31,2	29,5	28,6	30,4
<b>South Africa</b>	<b>32,7</b>	<b>33,7</b>	<b>35,7</b>	<b>36,1</b>	<b>35,8</b>	<b>36,2</b>	<b>36,1</b>	<b>36,9</b>

**Figure 2: Provincial unemployment rate among youth (15-34 years), 2008-2015**

a concerted effort should be made to shift the focus toward fostering entrepreneurship among youths. Doing so could be one of the most effective means to mitigate both unemployment and social affliction in disadvantaged communities (Statistics South Africa, 2014); (Kumo, Rielnder & Omilola, 2014).

The South African government continues to prioritize measures aimed at generating employment and promoting youth entrepreneurship as an innovative job creation solution. These include tax incentives for employment and investment, support for enterprise development, skills development and employment programmes (Statistics South Africa, 2014).

Industry leaders assert that the South Africa's target of creating 11-million jobs by 2030 through the National Development Plan (NDP) will require the creation of more than 49,000 new small enterprises, together with an economic growth rate of about 20% a year. It has been envisaged that small, medium and micro-sized enterprises development will help to curb SA's persistently high unemployment rate, which is presently narrowly defined at 25.1% (Mungadze, 2015). South African leaders are well aware of this challenge and have done the math; with roughly a doubling of per capita income growth, South Africa could achieve per capita income similar to that of Portugal or Poland in only 17 years. South Africans have set out their own vision for the next 20 years, in a way that is compelling and comprehensive. It calls for accelerating progress, building a more inclusive society, deepening democracy, and translating political emancipation into economic well-being for all (Immelt, 2015).

## **Status Report on Entrepreneurship and Innovation in South Africa**

South African government continues to make concerted effort to establish the country as an entrepreneurial nation that rewards and recognizes entrepreneurship. The new Small Business Development Ministry has an important role to play in achieving this goal. The Ministry has been established to deliver dedicated and focused support for small businesses and to ensure that the common challenges that confront the sector are addressed in a co-ordinate way. Priorities for the Ministry will include addressing the legal and regulatory environment; improving access to markets, and availability of finance; addressing the skills deficit; enabling better access to information; and improving the effectiveness and reach of support institutions (Ensor, 2015).

The Department of Trade and Industry has taken a centre stage to promote, regulate and support small business growth in the country. Despite all these efforts, the level of entrepreneurship in South Africa has been rated by the Global Entrepreneurship Monitor (GEM) (2015) to have one of the lowest numbers of entrepreneurs amongst its population compared to other nations within the developing world. The same report reveals that entrepreneurial activity in South Africa has dropped by 34% over the past year. Not only has there been an overall dip in activity, the report shows that the percentage of adults involved in a business less than three-and-a-half years old (the Total Entrepreneurial Activity (TEA rate) fell to 6,97% in 2014 from a 13-year high of 10,6% in 2013.

The entrepreneurship activist and researchers are of the opinion that entrepreneurship is not flourishing in South Africa because the entire ecosystem is fragmented. Although there are many initiatives by the government and the private sector, there is lack of cooperation and collaboration to support entrepreneurship in the country. It is also a challenge to retain entrepreneurs due to the weak literacy rate. Further findings suggests that education plays a major role in entrepreneurial activity in that the more educated the person, the more likely that person is to start a business, and that the business will continue to be sustainable. This finding emphasized the need for training in South Africa, particularly amongst the youth, where unemployment continues to increase year on year. (Tsele, 2015).

### **Key constraint for new entrepreneurial ventures and small businesses**

The entrepreneurs challenges may have one or more of the following dimensions:

1. **Access to finance** is the biggest barrier faced by many entrepreneurs and among the key challenges that contributes to the negative trends for entrepreneurs in South Africa. It is common for small, medium and micro-sized enterprises (SMMEs) to run into short-term cash flow problems. These can occur for any number of reasons. For example, businesses may experience short-term liquidity issues due to: seasonal downturns in revenue, overtrading, slow-paying accounts, investment in inventory or expensive equipment, a need to support rapid growth, use of cash to exploit opportunities. Without easy access to funding, any one of these issues can be enough to cause a business to falter.



2. **Access to market opportunities** is one of the fundamental barriers to South Africa's attempts to boost entrepreneurs and small, medium and micro-sized enterprises. Enabling small, medium and micro-sized enterprises to actively participate in the supply chain activities of major industries in the country will contribute to building sustainable small businesses which could potentially become larger enterprises.
3. **Restricted and inhibiting regulatory environment** coupled with the harsh penalties imposed for non-compliance. The legal processes in running a business can be cumbersome. The challenges not only start with the setting up or registration of company, but extend to a variety of general legislative requirements on governance, compliance and reporting activities. At times, these come at a high cost (particularly legal advice and auditing services). Nonetheless, in order to run a solid business all these challenges have to be navigated.
4. **Poor synergies between larger business and small business** whereby the smaller businesses struggle to attract or meet the standards of large corporate clients. The process is often daunting and often the requirements are not clear. The businesses are often too small to meet the capacity demands or seek funding too late as they do not understand the lengthy funding processes of financiers. This results in them not complying in time for funding.
5. **Poor coordination between Financial and non-financial support programmes** as there is centralized platform to share information and educate the market about available opportunities.

## **Challenges to Innovation and Entrepreneurship in South Africa**

Several challenges have been noted to affect innovation and entrepreneurship in South Africa and Africa as a whole. In his article (James, 2015) highlights three challenges entrepreneurs face in South Africa, namely: fast paced markets, marketing product and service and access to funding. (Staff Writer 2015) discusses five key constraints limiting entrepreneurship in South Africa, that is, Skills Deficit, Funding, Remote location and limited access to markets, Government procurement limitations and Limited commercialization of innovation from universities. Focusing on challenges facing women in the Gauteng province of South Africa, (Chinomona and Maziriri, 2015) highlight the following factors: Limited or no access to finance, Gender bias or Gender discrimination of women entrepreneurs, and Lack of Education and Training. With regards to Africa as a whole, (Feinstein, 2016) has identified the top six obstacles to start ups to African entrepreneurs, which are: Limited access to financing, Weak infrastructure, Inconsistent government regulations, Globalization, Minimal government assistance and cross-border payments. (Ekeledo and Bewayo, 2009) in their paper concerning challenges and opportunities facing African entrepreneurs and their small firms, discussed the following challenges: Globalization of Markets and Production, Lack of Financial Support, Poor Infrastructure, International Expansion and Government-Sponsored Assistance.

## **Survey of Government Policies and programs on Innovation and Entrepreneurship**

Over the years the government and finance houses has refined mechanism to support the entrepreneurship and the SMME sector and have developed policies, guidelines and practices narrating the kind of support needed. Although poor implementation continues to limit the startup growth, both the Departments of Trade and Industry and Economic Development play the most important role in developing and supporting structures to grow small business in the country.

1. The establishment of the Small Business Development Ministry to facilitate and promote a favourable environment for SMEs to thrive and to support the goals of the National Development Plan (NDP). (South Africa. DTI, 2015).
2. The National Development Plan focuses on incubation systems and early stage entrepreneurship development. (South Africa. The Presidency, 2011).
3. The National Growth Path (NGP) is a framework for economic policy and driver of South Africa's job-creation strategy. (South Africa. Economic Development Department, 2009).
4. The Industrial Policy Action Plan (IPAP) has a strong focus on localized supplier anchored in the Enterprise and Supplier and Development element of the recently revised BB-BEE Codes of Good Practice. (South Africa. DTI, 2014).
5. Enterprise and Supplier Development (ESD) is a code to support and grow emerging black business and promoting entrepreneurship. This Black Economic Empowerment code requires South African companies to spend 3% of their annual profits on support for black owned enterprises. (South Africa. DTI, 2012).
6. The Township Revitalization Strategy aims to contribute to the overall vision of South Africa underpinned by the National Development Plan which emphasizes that 90% of the new 11 million jobs to create by 2030. (South Africa. Gauteng Department of Economic Development, 2014).
7. The Integrated Strategy on the Promotion of Entrepreneurship and small enterprises aims to unlock the potential of the South African entrepreneurs. (South Africa. DTI, 2006).
8. The Small Enterprise Development Agency (Seda), the Department of Small Business Developments agency established in December 2004, through the National Small Business Amendment Act, Act 29 of 2004, merging the previous small enterprise development agencies Ntsika Enterprise Promotion Agency, NAMAC Trust and the Community Public Private Partnership (CPPP) into a single small enterprise support agency. The agency is mandated to implement the governments small business strategy, design and implement a standard and common national delivery network for small enterprise development and integrate government-funded small enterprise support agencies across all tiers of government. (South Africa. DTI, 2004).
9. The Small Enterprise Finance Agency (SEFA); established in 2012 as a result of the merger of South African Micro Apex Fund, Khula Enterprise Finance Ltd and the small business activities of IDC. The agency's mandate is to foster innovation and

the establishment of sustainable SMMEs to contribute towards poverty alleviation and job creation in the country. (South Africa. DTI, 2012).

Over and above supporting the development of small business and entrepreneurship, the government needs to assist small businesses to become innovative. This means that the Department of Small Business Development needs to focus on funding new and innovative ideas:

- Ensuring that both the venture capital incentive and research and development (R&D) tax incentive work;
- Ensuring that the troubled Technology Innovation Agency gets its seed funding program back up and running;
- Ensuring that the applications for funding to Support Program for Industrial Innovation are re-opened. Following a notice earlier in the year by the Department of Trade and Industry temporarily closing the fund; and
- Ensuring that support be given to develop an angel investing community and groups of angel investors.

These moves will ensure that innovation is not only associated with the rich and the more educated. In its drive to support and fund more entrepreneurs, the department also needs to fund ways to ensure that these small businesses are focused on innovation. In addition, the quality of personnel at Seda and Sefa are vamped up by employing the services of those with business experience and partnering more with the private sector.

## **Emerging Innovation and Entrepreneurship that Foster Economic Development and Job Creation in South Africa**

(Ngek and Smit, 2013) argue that high growth SMEs are better positioned for creating jobs and further recommended that the South African governments policy should focus on the following: SMEs with high quality and high growth potential, encouraging the creation of more business angels and venture capital firms, providing access to many finance options including debt financing, removing constraints on SMEs and rewarding SMEs with growth ambitions. Despite poor synergies between the different stakeholders in the country, both the public and the private sector have launched a wide variety of vehicles to foster innovation and entrepreneurship in the bid to assist the government to create jobs and fuel the growth of the economy.

1. Business incubators and small, medium and micro-sized enterprise support creates a synergistic environment where entrepreneurs can share, create working partnership and act as enablers to access markets and resources. Critical to the incubator is the provision of management guidance, technical assistance and consulting tailored to young growing companies. These incubators must also provide to potential youth entrepreneurs information on appropriate space and flexible leases existing in the market, shared basic business services and equipment, technology support services and assistance in obtaining the financing necessary for company sustainable growth. (Ndedi, 2009: 468)

2. Enterprise Development Hubs are facilities established as results of partnerships between local governments, government departments and local businesses to enable entrepreneurs and small businesses to access necessary resources for the success of their businesses.
3. Endeavor Entrepreneur programme focuses on the scale-up and not start-up because the programme champions believe that is where the highest job and wealth creation happens. Endeavor Entrepreneurs are innovative business leaders who have crazy dreams about disrupting the industries and markets within which they operate, both locally and globally. To date, Endeavor South has created nearly 5,000 jobs and 22 companies.
4. The Innovation Hub is a centre that was developed to create a unique space to bring hi-tech entrepreneurs, industry, academics, researchers and venture capitalists together. The Innovation Hub and the Council for Scientific and Industrial Research (CSIR) have entered into a partnership to support entrepreneurs and ensure they contribute to the growth of the economy.
5. Coordinated Collaboration spaces create collaboration opportunities between entrepreneurs, various organizations to share experiences, needs, to leverage best practice to understand how the various players fit in the ecosystem. The academic institutions have already made inroads in creating forums and workshops to bridge the gap between Corporate South Africa and the small, medium and micro-sized enterprises. The University of Pretoria Gordon Institute of Business Science (GIBS) Business School is a pioneer in collaboration forums and presenting academic sessions for those who wish to explore entrepreneurship.

The listing above is by no means exhaustive but indicative of the efforts that are made throughout the country to support the governments effort to promoting innovation and entrepreneurship as vehicles for job creation and economic growth.

## **Recommendations**

A radical mindset change in South Africa is necessary to encourage entrepreneurs to conceptualize and develop solutions, products and services that will result in a win-win solution for all, that is boost job creation and drive economic growth. The scenarios explored in this work suggests that a win-win solution can be achieved if:

- The South African corporate sector is willing to invest in innovative measures to change the way business is conducted today,
- A collaborative movement including big business and service providers is established to facilitate access to markets for the small business,
- Academia provide platforms that link government with private sector and small business to ensure their policies are indeed assisting entrepreneurs on the ground as well as assisting big business to empower entrepreneurs,
- Research organizations share their market knowledge and distribute their research findings to the wider ecosystems.

- As the country has one of the highest failure rates of business startups in the world, investment and support of these businesses is critical, such as through business incubator programmes or solid mentorship programmes.
- Strengthening entrepreneurship Education and Training as well creation of opportunities to teach entrepreneurs how to network with each other and with investors to ensure that innovative ideas are not left to flounder in isolation.
- There is opportunity to provide collaboration between the various stakeholders to share experiences, needs, to leverage other organizations and to understand how the various players fit in the ecosystem.

## Conclusions

Although South Africa's entrepreneurial activity is actually improving (albeit at a small pace); research reveals that for the most part it still lags behind. While there have been government policies and programs to promote entrepreneurship in South Africa, there are still many challenges young entrepreneurs face. Entrepreneurial activity in the country plunged by an alarming 34% in 2014 and further analysis shows that South Africa has one of the highest failure rates (those running established companies as a ratio of the sum of both established and early-stage entrepreneurial activity).

Despite governments commitment to supporting entrepreneurship and growing the country's small, medium and micro-sized enterprises (SMMEs), this business sector continues to face an extremely hostile business environment, including lack of skilled staff, burdensome regulations, tough local economic conditions, lack of finance and the high costs associated with employing staff. In addition, compliance and restrictive labour laws are still critical barriers to entrepreneurship and small business growth. The SMMEs feel excluded from the process of drafting legislation and are not familiar with the various laws. Furthermore, self-employment and entrepreneurship are accompanied by their own problems such as the lack of appropriate education, limited access to capital as well as the lack of social networks, which have the consequence of preventing entrepreneurship from becoming a solution to youth unemployment.

The NDP makes it clear that getting South Africa onto a high-growth trajectory demands that the country places small businesses and co-operatives at the centre of our war against poverty, inequality and unemployment. The government has taken a step by establishing a Ministry of Small Business Development which serves as strategic move to ensure that the small business owners will be well served by understanding the mandate of this ministry and some of the practical help that it has set out to provide for this sector. Additionally, a well-structured collaborative approach is instrumental in facilitating an environment for sharing best practice, learning from each other and sharing ideas to drive innovation.

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# Cloud Computing: The Next Generation Computing Model to Accelerate Innovation in Kenya

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## Abstract

The need for innovation is becoming more imperative today for Africa and Kenya as a nation. Countries in Africa have been unable to compete in the global market due to lack of innovation in various industry sectors. A major area of Innovation is in information technology, engineering and technology. The business world globally is witnessing rapid developments in information technology that is significantly changing the way business is being done. One such technology is Cloud Computing. This paper focuses on the Cloud Computing technology and seeks to enunciate it as a potential and significant platform that can drive and accelerate innovation in Kenya within various industry sectors. The paper reviews the Cloud computing technology and current impact on global innovation, discusses the need for innovation in Kenya and readiness for the adoption of the technology. The paper concludes with Cloud Computing utilization strategies as well as innovation opportunities within Kenya. **Relevance to innovation.** This paper addresses the innovative computing technology of Cloud Computing. As a pervasive technology that is presently changing business processes and businesses, Cloud computing is described in general and posited as an innovative technology necessary for adoption in Kenya and the African continent as a whole. The paper shows Cloud computing as a world class technology with the potential to change the whole discipline of computing and software engineering as we know it. Adopting Cloud computing in Kenya across various industry sectors is considered a major innovative strategy for educating a new workforce, creating economic growth and rapid product and service development.

**Keyword.** Business, Cloud, Computing, Innovation, Software

## Introduction

There is need for innovation across various sectors of industry especially in product development and manufacturing. Kenya as a country needs to continue to encourage and

make a paradigm shift to a truly production economy. This would require significant development and progress in the design and manufacturing industry. In improving innovation across industries, there is urgent need to leap frog ahead to at least start to compete in a global economy that is increasingly becoming ubiquitous. The last two to three decades has witnessed significant advancement in computing technologies and information technology. These advancements have literarily changed the business world to the extent that IT has clearly in the last couple of years become a significant factor of business competitiveness. In the recent past, a major technology that is gradually changing the business world and would certainly change the business paradigm for the 21st century is Cloud Computing.

The adoption of Cloud Computing technology in the global economy has been increasing steadily within the last 10 years, but much more rapidly within the last 3 years. Evidence is abounding that it is a technology that would not only be beneficial to global economy, but will likely radically change the way business processes will be performed in the future across all industry sectors and markets. Just like the adoption of Cloud computing is rapidly growing, the amount of and body of research is also expanding globally with various sectors such as manufacturing and construction, beginning to explore how Cloud computing can enable and improve business processes.

## **Cloud Computing Fundamentals**

### **What is Cloud Computing**

The evolution of Cloud computing has drawn significantly from other prior technologies such as Service Oriented Architecture (SOA), Web Services, web 3.0, grid computing and virtualization. The increasing development and adoption of Cloud computing has caused significant shift in the computing paradigm making utility computing a more realizable goal as the management of services over the internet have become more pervasive and easily achievable.

Cloud computing has been described and defined in several ways. Some of the key and more common definitions are as follows: Cloud computing enables rapid delivery and consumption of IT on-demand services in concert with constantly changing business drivers. The Cloud is a model that encompasses business requirements, technology, organization, automated process and a real, IT-as-a Service lifecycle management framework. The Cloud computing framework whilst supporting IT applications synchronizes with new innovation of the future (Gamull, 2013).

Cloud Computing has been proposed as follows: A computing Cloud is a set of network enabled services, providing scalable, Quality of Service (QoS) guaranteed, normally personalized, inexpensive computing platforms on demand, which could be accessed in a simple and pervasive way (Wang and Laszewski, 2008).

From an economic perspective, Cloud Computing is defined as follows: Building on compute and storage virtualization technologies, and leveraging the modern Web, Cloud Computing provides scalable and affordable compute utilities as on-demand services with variable pricing schemes, enabling a new consumer mass market (Klems et al, 2009).

Cloud computing refers to both the applications delivered as services over the internet and the hardware and systems software in the datacenters that provide those services. The services themselves have long been referred to as software as a service (SaaS). The datacenter hardware and software is what we will call a Cloud (Armbrust et al, 2010).

Cloud computing is both a UX and a business model. It is an emerging style of computing in which applications, data, and IT resources are provided to users as services delivered over the network. It enables self-service, economies of scale, and flexible sourcing options an infrastructure management methodology a way of managing large numbers of highly virtualized resources, which can reside in multiple locations (IBM, 2010).

Clouds are a large pool of easily usable and accessible virtualized resources (such as hardware, development platforms, and/or services). These resources can be dynamically reconfigured to adjust to a variable load (scale), allowing also for an optimum resource utilization. This pool of resources is typically exploited by a pay-per-use model in which guarantees are offered by the infrastructure provider by means of customized SLAs (Vaquero et al, 2009).

A cloud is a type of parallel and distributed system consisting of a collection of interconnected and virtualized computers that are dynamically provisioned and presented as one or more unified computing resources based on service level agreements established through negotiation between the service provider and consumers (Buyya et al, 2008). Frost & Sullivan (2013) define cloud computing as a flexible and scalable IT environment in which service providers leverage virtualization technologies to create and distribute computing resources to customers on an as-needed basis, through a private or public network and where the service is priced according to a per-use basis.

The U.S. Department of Commerce National Institute of Standards and Technology (NIST) defines Cloud Computing as "a model for enabling ubiquitous, convenient, on-demand network access to a shared pool of configurable computing resources (e.g., networks, servers, storage, applications, and services) that can be rapidly provisioned and released with minimal management effort or service provider interaction. This cloud model is composed of five essential characteristics, three service models, and four deployment models.

The above NIST definition developed over a period of years by many researchers working together is perhaps the most popular and widely used. This definition summarizes the key contents and activities of the representative standard Cloud Computing Architecture by NIST. This overarching architecture shows Cloud Computing as robustly consisting of five major actors, namely: Cloud consumer, Cloud provider, Cloud broker, Cloud auditor and Cloud carrier (NIST, 2013), as shown in Figure 1.

The Cloud consumer is a person, or organization that maintains a business relationship with, and uses service from Cloud Providers. The Cloud provider is a person, organization or entity responsible for making a service available to Cloud Consumers. The Cloud broker is an entity that manages the use, performance and delivery of cloud services, and negotiates relationships between Cloud Providers and Cloud Consumers. The Cloud auditor is a party that can conduct independent assessment of cloud services, information system operations, performance and security of the cloud implementation. The Cloud carrier is the intermediary that provides connectivity and transport of cloud services from Cloud Providers to Cloud Consumers.

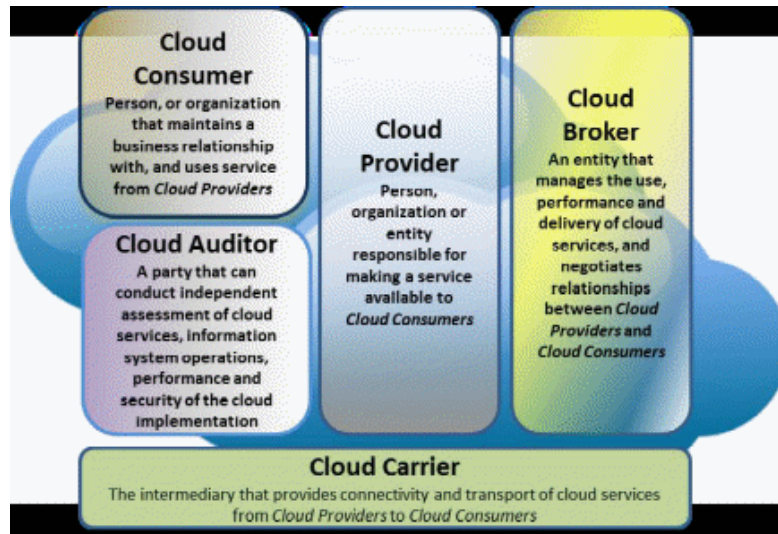


Figure 1- Cloud Actors (NIST, 2013)

### Main Characteristics/Attributes of Cloud Computing

The NIST definition identifies five key and essential characteristics that define what has come to be known as Cloud Computing. They are:

- On-demand self-service
- Broad (Ubiquitous) network access
- Resource (location independent) pooling
- Rapid (Scalable) elasticity
- Measured service

Other characteristics include the following (Mayfield , 2011):

- Disperse geographical distribution
- Homogeneity
- Service orientation
- Advanced security
- Massive scale
- Virtualization
- Relatively low cost software
- Multi-tenant
- Reliability
- Utility based subscription
- Resilient computing

### Cloud Computing Deployment/Delivery Models

In the implementation of Cloud computing, depending on the requirements and desired use and application, four main deployment/delivery models are generally adopted. These

models can be deployed individually or in combination with one another to achieve the desired result for users. These models also comprehensively defined by (NIST, 2013) are: Private Cloud, Public Cloud, Community Cloud and Hybrid Cloud as described below.

**Private cloud.** This deployment model is developed exclusively for use by a single organization, with multiple users/consumers and business units/divisions. It is akin to company intranets where only those within the individual organization have access to it. Private clouds can be owned, managed/maintained, and operated by the organization, a third party, and in some cases by both.

**Public cloud.** This model/infrastructure is provisioned for open use by the general public. It can be owned, managed, and operated by a business, academic, or government organization, or some combination of them. It is usually accommodated on the premises of the cloud provider.

**Community cloud.** This model/infrastructure is provisioned for exclusive use by a specific community of consumers from organizations that have shared concerns (e.g., mission, security requirements, policy, and compliance considerations). It may be owned, managed, and operated by one or more of the organizations in the community, a third party, or some combination of them, and it may exist on or off premises.

**Hybrid cloud.** The cloud infrastructure is a composition of two or more distinct cloud infrastructures (private, community, or public) that remain unique entities, but are bound together by standardized or proprietary technology that enables data and application portability (e.g., cloud bursting for load balancing between clouds).

## **Cloud Computing Service Models**

The generally known service models are Software as a Service (SaaS), Platform as a Service (PaaS) and Infrastructure as a Service (IaaS). More recently and especially for applications within major business enterprises, the emerging Business process as a Service (BaaS) is being developed. These service models operate within the Cloud computing infrastructure.

A cloud infrastructure is generally considered to be the collection of hardware and software that enables the five essential characteristics of cloud computing. The cloud infrastructure contains both a physical layer (hardware resources that are necessary to support the cloud services being provided, and typically includes server, storage and network components) and an abstraction layer (the software deployed across the physical layer, which manifests the essential cloud characteristics).

**Software as a Service (SaaS).** The capability provided to the consumer is to use the providers applications running on a cloud infrastructure. The applications are accessible from various client devices through either a thin client interface, such as a web browser (e.g., web-based email) or a program interface. The consumer does not manage or control the underlying cloud infrastructure including network, servers, operating systems, storage, or even individual application capabilities, with the possible exception of limited user-specific application configuration settings. Applications used by businesses are provided on a subscription basis

**Platform as a Service (PaaS).** The capability provided to the consumer is to deploy onto the cloud infrastructure consumer-created or acquired applications created using

programming languages, libraries, services, and tools supported by the provider. The consumer does not manage or control the underlying cloud infrastructure including network, servers, operating systems, or storage, but has control over the deployed applications and possibly configuration settings for the application-hosting environment. PaaS involves virtualized development and runtime platforms.

**Infrastructure as a Service (IaaS).** The capability provided to the consumer is to provision processing, storage, networks, and other fundamental computing resources where the consumer is able to deploy and run arbitrary software, which can include operating systems and applications. The consumer does not manage or control the underlying cloud infrastructure but has control over operating systems, storage, and deployed applications, and possibly limited control of select networking components (e.g., host firewalls). IaaS consists of both shared virtualized, dynamic provisioning and raw infrastructure available on an as need basis for private or public clouds.

**Business process as a Service (BaaS).** Involves capability provided for the user and a new and an emerging concept within cloud computing. It comprises of standardized and best of breed industry specific processes as well as standardized horizontal and vertical business processes provided on a subscription basis to individual clients or industries.

## **Need for Innovation in Kenya and Africa**

Kenya as a developing economy in the 21<sup>st</sup> century like most of the countries in Africa is in great need of accelerated growth and development to at least start to close the gap with the rest of the world. There is need for inward investment as well as from the international community to energize and cause rapid development in the various sectors of the economy. There cannot be development and growth in an economy void of innovation. Innovation is needed in every facet of the economy from government, manufacturing, finance, infrastructure to commerce, logistics, telecommunications, healthcare and agriculture to name a few. This innovation week organized in Nairobi is a significant and positive move to encourage and push forward the agenda of economic development, job creation and growth in the Kenyan economy. With increasing population of young people less than 30 years old, Kenya certainly needs a more concerted effort towards encouraging innovation in various sectors of the economy. A key enabling sector for all of these other sectors is information and communication technology or more generally information technology. Innovation in the ICT sector appears to have witnessed the greatest proportion of innovation by leaps and bounds world wide. The emergence of various computing technologies including the internet, mobile and network technologies, big data, the internet of things and cloud computing inter-alia has resulted in significant advancement and development in design, manufacturing and business process innovation on a global scale that has hitherto not been witnessed even in advanced and developed economies.

The Kenyan government has taken a significant lead in Africa towards encouraging innovation in ICT (2014). This document covers a strategic plan to be implemented over the period of 2013/2014 to 2017/2018. The report enunciates that, although Kenya has a low innovation index, the country however has a great potential for developing innovations in the ICT sector. It believes that ICT is a critical tool in Kenyas vision of a knowledge based economy, and should focus on innovation where creation, adoption,

adaptation and use of knowledge as the key source of economic growth are main drivers. The government is encouraged to create appropriate policies and infrastructure necessary to foster creativity and innovation in the ICT sector. In this regard, efforts are being made to establish innovation centers of excellence (CoEs) and Science and Technology (S&T) parks to carry our research in the ICT sector for application and services, that can readily be translated into entrepreneurial ventures and economic growth in the country.

The report by the Kenyan Ministry of Planning and National Development, courtesy of UNDP (2005), argued that science, technology and innovation play a significant role in achieving all the eight Millenium Development Goals discussed in the report.

In the specific area of Mobile technologies, the Digital Entrepreneurship in Kenya 2014 report (Drouillard, 2014) addresses current trends in Kenyas digital innovation and entrepreneurship ecosystem. Whilst making some key and important recommendations to government, research agencies, innovation hubs, investors and financial institutions, the report highlights that the potential for Kenya (and especially Nairobi) to become a leading hub for digital entrepreneurship in Africa is extraordinary.

## **The Impact of Cloud Computing on Current Global Business Innovation**

The global cloud computing market is expected to reach approximately US\$86 billion in 2016 from an estimated US\$36 billion in 2013, growing at a compound annual growth rate of 33.4%. While SaaS continues to be the most popular cloud service offerings with users, IaaS is witnessing growing adoption and is expected to grow at 40% per annum for the 2013-2016 period (Frost & Sullivan, 2013).

There is no doubt that the uptake of Cloud Computing in various sectors of industry is rapidly increasing and its impact on business is evidently being discussed, explored and realized. In some sectors, Cloud Computing is now being seen as an integral part of the wider evolution of application development [Compuware]. Cloud computing is no longer just about new ways of delivering software, but now a valuable model for software development and testing as well as offering a new business model for managing development tools employed for application development.

Koeppel (2014) in his article says that Cloud computing is ideally positioned to become a significant catalyst of business model innovation, and CIOs and their IT staff need to be thinking about how to leverage cloud computing to increase the value of their IT investments and evolve their roles as value-added enablers of business outcomes. (LeBlanc, 2014 ) of IBM in his paper, discusses three trends that can speed up the adoption of Cloud computing. These are: (i) Linking systems of records with next-generation systems of engagement, (ii) Using clouds to speed innovation and (iii) Using clouds to speed innovation

From his interview with Adam Davidi of the Guardian Media Network, (Midgley, 2013) stressed that "Cloud computing has levelled the playing field as smaller companies gain the resources to compete in ways that were very expensive and often cost prohibitive in the past. The industry is moving towards a cloud enabled enterprise, especially by becoming more agile.



Berman et al. (2012) in their paper comment that: "To take advantage of clouds potential to transform a company's internal operations, customer relationships and industry value chains, organizations need to determine the best way to utilize cloud enabled business models that promote sustainable competitive advantage. They also highlight that cloud computing business innovation enablers do so by helping to spur innovation across customer value propositions (Enhance, Extend, Invent) and across company and industry value chains (Improve, transform, create).

In a recent report by the intelligence unit of the Economist, (Ridley, 2014) posits that cloud adopting by companies is rendering the division between IT and business obsolete and the associated organization chart. Expert and user roles are merging, blurring the lines between business and technology functions. (Huomo, 2014) highlighted that for ICT providers, moving to the cloud is beyond the adoption of a new technology platform but also about transforming the way they deliver value to their customers. She enunciates the idea of Future Cloud highlighting the fact that switching to the cloud is not just about the technology it's about seeing the bigger picture: new products and services, new processes, new business models and new potential. This is not about business growth, but business transformation. With respect to impact on jobs, (Liebenau, 2014) indicates that cloud computing will create jobs and new business opportunities, but which countries and sectors see the most benefits, will partly depend on policy.

(RightScale, 2015) surveyed 930 technical professionals across a broad cross-section of organizations about their adoption of cloud computing. Key findings include:

- Cloud is a given and hybrid cloud is the preferred strategy.
- Public cloud leads in breadth of enterprise adoption, while private cloud leads in workloads.
- Significant headroom for more enterprise workloads to move to the cloud.
- Enterprise central IT teams take the reins to broker cloud services.
- DevOps (Development and Operations) rises and Docker soars.
  - Docker is an open platform for developers and system admins to build, ship, and run distributed applications, whether on laptops, data center VMs, or the cloud.
- Amazon Web Services (AWS) continues to dominate in public cloud, but Azure makes inroads among enterprises.
- Private cloud stalls in 2015 with only small changes in adoption.

## **Benefits of Cloud Computing**

In the report by (Compuware, 2011), it was highlighted that a significant benefit of Cloud Computing is the move from a world dominated by Capex (Capital Expenditure) with its associated write-downs and depreciations, to a world of Opex (Operational Expenditure), or to put it very simply a pay-as-you-go model. Money is thus directed towards solving the business needs rather than increasing the business asset pool. Benefits have been shown to grow with increasing cloud usage and adoption maturity (Mayfield, 2011, RightScale, 2015, Compuware, 2011, Frank, 2008, The Institution of Engineering and Technology, 2012).

- Cost Savings
- Business Agility and more flexibility
- Business Innovation at low risks
- Focus on Core competency
- Enables mobility, Big data and Social trends
- Enhanced efficiency and scalability
- Automation, standardization and Control
- Greater scalability, faster access to infrastructure, higher availability, faster time to market, efficiency of IT staff, Geographic reach, Business continuity, Higher performance, Move CapEx to OpEx
- Managed operations, Utility pricing/monthly payments, virtualized resources, elastic resource capacity, standards based systems, delivered over the internet, self service provisioning, third party ownership, management automation
- Pay only for what you use
- Fast deployment to end users
- Low monthly payments
- Requires less in-house IT staff and costs
- Simpler systems/information sharing
- Easier group collaboration
- Device independence
- Lower capital costs
- Lower management and operation costs
- Reduced CO2 emissions
- Speed of deployment

In the Enterprise Resource Planning (ERP) arena, (Mattison & Saideep, 2012) argue that the migration of ERP systems to the Cloud environment is no longer a matter of "if, but" when. They believe that the capabilities and potential savings offered by moving to Cloud based ERP are too great to ignore. Such benefits include inter-alia:

- Faster implementation: easier to use and deploy
- Greater flexibility: system configuration, pricing is more flexible
- Lower total cost of ownership (especially start-up cost): savings can be 30% to 50% of TCO compared to on-premise ERP
- Less dependency on IT staff and/or on-premise hardware

In our view, the critical question isn't whether cloud computing will become a fundamental deployment model for ERP systems in the next decade; but how successfully companies will profit from the capabilities it offers.

In emerging economies of Africa, Asia and South America, cloud computing is also fast gaining ground. (Finger, 2009) highlights the following key observations:

- Cloud Computing has the potential of leveling the playing field between large and smaller companies. Thus opening a new world to developing and emerging economies along with the industrialized world
- Cloud computing will enable the creation and deployment of new and innovative business processes and operations that would allow more collaboration across the enterprise

- Cloud computing will enable businesses to be more adaptable and interconnected
- Cloud computing would be an enabler of new business models

Cowhey and Kleeman (2012), in their paper also argued the following

- The Cloud is central to global competitiveness because goods and services are becoming more ICT intensive
- The Cloud is vital to being competitive in South-South commerce the fastest growing share of trade and investment and the future home to most of the worlds middle class
- Cloud Computing strengthens SMEs, stimulating job creation and it levels the field for technology suppliers in the Global South, allowing near parity in content and services economics with traditional suppliers
- The Cloud has the potential to lower the barriers to access to ICT capabilities for businesses and citizens around the world and fundamentally improve the integrity, quality and speed of the delivery of government services.
- It gives SMEs in the Global South functionally the same ICT capabilities as many Fortune 50 firms, and doing it at similar unit and transaction costs. In South Africa small firms with under 100 employees have full CRM functionality via Cloud delivered Salesforce.Com
- Global in scope and massive in scale, the Cloud is permanently altering the economics and delivery of IT enabled capabilities. In India a study showed that move to Cloud based systems would reduce a typical firms IT costs by 1/3rd. A direct marketing firm increased transactions by 100 times in 3 years, moving to the Cloud to help them scale and respond to peak demand without making costly capital investments.

## **Current Readiness Assessment of Cloud Computing Uptake in Kenya**

Previous work done by Omwansa and Waema (2013) has comprehensively addressed the current situation on Kenya with regards the uptake of Cloud computing in Kenya. They key points of that research are summarized as follows:

- Cloud computing is a few years old in Kenya. Private Cloud is more popular. 57% of the respondents indicated they adopted cloud technology in either 2010 or 2011. More organizations utilized pure private cloud (39%) compared to utilizing a public cloud (22%).
- Majority are not aware of cloud computing standards, policy or legal frameworks 75% are not aware of any standards. 80% are not aware of policy or legal frameworks. Those aware feel the frameworks are not as comprehensive, flexible and effective as they ideally should be.
- Market is ready for cloud technology but awareness and skills are low 90% of the respondents thought the cloud services market was ready but there are a lot of misunderstandings about the technology. Some technical skills are seriously lacking.

- Government to be the champion by promoting and adopting cloud By adopting the cloud, the government would set pace for better uptake by the private sector. By providing services through the cloud, the government is likely to improve overall quality of delivery.

## **Proposed Strategy for Cloud Computing Utilization in Kenya**

There is now sufficient evidence in literature and from the experience of businesses in many sectors that the adoption of Cloud Computing results in significant benefits. As part of the ideas being enunciated in this Innovation week, the authors believe that Kenya is well positioned to start exploring ways to adopt cloud computing for the benefit of the country. The proposed strategy would be to adopt an incremental approach for the uptake of the new technology. This will consider the current status and maturity of cloud computing uptake in Kenya.

Rightscale (2015) enunciates the idea of Cloud uptake by organizations based on a Cloud Maturity Model. The model segments organizations based on their levels of cloud adoption, and identifies four distinct stages of cloud maturity based on least to greatest experience as shown below.

- Cloud Watchers – organizations that are developing cloud strategies and plans but have not yet deployed applications into the cloud. Cloud watchers want to evaluate available cloud options and determine which applications to implement in the cloud.
- Cloud Beginners– are new to cloud computing and are working on proof-of-concepts or initial cloud projects. Cloud beginners want to gain experience with cloud in order to determine future projects.
- Cloud Explorers – these have multiple projects or applications already deployed in the cloud. Cloud Explorers are focused on improving and expanding their use of cloud resources.
- Cloud Focused – businesses that are heavily using cloud infrastructure and are looking to optimize cloud operations as well as cloud costs.

From the prior research work by Omwansa and Waema (2013), the strategy enunciated towards the adoption of Cloud Computing in Kenya includes inter-alia:

- Assessment of the cloud readiness of the country: to clearly understand the current situation at national level through an elaborate national study.
- Developing a national cloud strategy: focusing on issues like capacity building, architectures and implementation.
- Government as a champion of cloud services: by adopting use of the cloud to provide services, government would set pace for better uptake by the private sector.
- Enhance the relevant legal and regulatory frameworks: protection of cloud service users, addressing cyber security challenges, guaranteeing secure online payments, privacy and data security need to be clearly articulated.
- Develop the human resource capacity: technical skills, legal skills and management skills to ensure contracts are well formulated and managed need to be developed.

- Enhance the awareness of cloud technologies: through a multi-stakeholder approach, the technology needs to be demystified and accurate information sent to potential consumers.

## **Innovation Opportunities of Cloud Computing in Kenya**

Making the case for the adoption of Cloud computing as an innovative technology for the Kenyan industry is clearly justifiable. There is evidence of recent developments within the industrial sector, educational institutions and the government engagement. Within the current trend and climate, anticipated sectors that would immediately benefit and provide the opportunity platform for Kenya include the following:

- Government institutions both at national and local levels
- Manufacturing industries particularly small to medium enterprises
- Construction companies
- Mobile Applications
- Education & Training
- Banking
- Healthcare
- Customer Relationship Management (CRM) applications
- Enterprise Resource Planning (ERP) applications

Cloud computing models for these sectors can include one or a combination of public, private, Hybrid and multi cloud models and frameworks.

## **Conclusion**

Cloud computing as a rapidly emerging digital technology has been briefly reviewed in this paper along with discussions on how it is impacting the global business climate. This paper clearly argues that this emerging technology is needed in Kenya today for the desired innovation and economic development of the country. Prior work gives an indication of how cloud computing can be implemented and taken advantage of in the country in the various industrial, educational and governmental sectors in the country. Cloud computing as a next generation computing model is expected to undoubtedly change and impact software development for the future in the global economy. Kenya as well as other African nations keen to not remain observers, but engaging and possibly leap frogging in technological advancement at least in the ICT sector, would do well to get involved now with Cloud computing.

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# Creating Novel Approaches to Developing Tacit Knowledge and Skills in Innovation Management.

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## Abstract

This paper describes the TACIT4 (Teaching and Coaching Innovation Innovatively) project, a 3-year European Union Knowledge Alliance (2016-2018) project under the Erasmus+ programme. The project combines the efforts of business and university educators to create new learner-centred teaching methods, opens up new learning opportunities, and develops the practical application of entrepreneurial skills. The outputs will be innovative teaching modules which could be embedded in the existing curricula of higher-education institutions and in corporate training programs. The project is designed to develop and test mechanisms that can be used to build tacit knowledge in individuals around innovation and entrepreneurship. The focus is not on developing a new core curriculum, but rather on taking the important elements of existing curricula and focusing on exploring more effective delivery mechanisms. As people's culture of learning is largely coined through the educational institutions, the project follows a threefold approach; research, teaching, and practice.

**Relevance to innovation.** Harnessing known knowledge about how to stimulate, teach and manage innovation requires innovation in itself. The TACIT programme (Teaching and Coaching Innovation innovatively) will, following a research and development phase in six real organisations and three academic departments, create an innovative package of ways to teach & coach innovation; tools that others will be able to adopt. Co-production with public and private sector organizations creates a novel scenario. Incidental to the TACIT project, the UK government hospital involved works with Kenyan hospitals to try and leverage improvements in healthcare, creating another exciting opportunity to test the project's output.

**Keywords.** healthcare innovation, learning entrepreneurship, tacit knowledge, teaching innovation, university-industry cooperation

## **Introduction**

To remain successful in a rapidly changing world, organizations must change their offerings (products/services) and their creation and delivery processes. Despite a considerable knowledge-base internationally about how to build innovation management capability, organizations and academics still struggle to make innovation happen. Ideas must be stimulated and nurtured but for these ideas to be useful, these general principles need to be adapted and configured for particular settings. Innovation needs “managing”.

The TACIT programme is a 3-year European Union Knowledge Alliance (2016-2018) Erasmus+ project, in which six diverse organizations (private and public) and three academic institutions are exploring the pedagogies that develop the individual’s ability to face and adapt to the innovation and entrepreneurship challenge. It seeks to understand the learning challenges which organizations and individuals face in developing understanding and skills for innovation management and is developing and prototyping a series of novel approaches to developing tacit knowledge and skills in innovation/entrepreneurship.

The participating organisations are exploring and prototyping eight complementary approaches to the challenge; storytelling, peripatetic learning, future-based learning, entrepreneurship laboratory, innovation theatre, innovation games, design making, and project-based learning. They will be packaged as tools that can be used by other organisations.

The inclusion of a public sector partner in healthcare creates an interesting opportunity to learn across sectors at a time when health and care systems across the globe face major challenges. Innovation strategies which will enable delivery of better value care are imperative.

## **Method**

The TACIT project is designed to develop and test mechanisms than can be used to build tacit knowledge in individuals around innovation and entrepreneurship. The focus is not on developing a new core curriculum, but rather on taking the important elements of existing curricula and focusing on exploring more effective delivery mechanisms.

The project capitalizes on the shift in thinking towards new modes of delivery (for example, the ‘flipped classroom’ and the shift to massive open online courses (MOOCs)) and also explores pedagogies that develop the individual’s ability to face and adapt to the innovation and entrepreneurship challenge.

The research focuses on the learning challenges that organizations and individuals face in developing understanding and skills for teaching, learning, and managing innovation. In particular it explores the range and efficacy of different delivery modes with a view to providing methodologies for better matching context with such delivery modes. The design of the project reflects some core principles in innovation management: co-creation with partners and users and learning through prototyping and iterative experimentation. The project is being delivered in four phases of work, each engaging all partners within the alliance and building on shared knowledge and experience. It is currently in Phase II. The project design, core teaching approaches for innovation and entrepreneurship

**Table 1. TACIT Project Design**

Year 1		Year 2				Year 3	
INPUT & MILESTONES							
Phase I: 6 month		Phase II: 12 month		Phase III: 12 month		Phase IV: 6 month	
Needs Analyses		Initial Prototyping		Final Stage Prototyping		Finalising outcomes	
3 Concept workshops: Statement of Need & Identification of State of the Art	4 month of initial design	8 month initial prototyping & field testing via laboratory & prototyping workshops towards one I&E module		4 month of analyses of feedback & refined design	8 month final stage prototyping & training workshops & 1 launch event of I&E module		Finalising Curricula of TACIT as a training course for higher education and education of practitioners Placement of TACIT teaching materials on companies' & ISPIM websites Open Educational Resources (OER): Pedagogical materials & Teaching Guideline available at the Innovation Portal Showcasing the I&E module Submission for Certification with ASIIN
		Method 1	Storytelling		Method 1	Storytelling	
Method 2		Peripatetic learning	Method 2		Peripatetic learning		
Method 3		Futures-based learning	Method 3		Futures-based learning		
Method 4		Entrepreneur laboratory	Method 4		Entrepreneur laboratory		
Method 5		Innovation theatre	Method 5		Innovation theatre		
Method 6		Innovation games	Method 6		Innovation games		
Method 7		Design making	Method 7		Design making		
Qualitative interviews in companies to confirm industrial need	4 universities with 6 companies designing 8 methods	4 universities with 6 companies refining 8 methods		4 universities with 6 companies refining 8 methods	4 universities with 6 companies refining 8 methods		4 universities with 6 companies refining 8 methods
Quantitative surveys of university students to confirm teaching need		Method 8	Project-based learning		Method 8	Project-based learning	
Quality and financial control plan	Quality assurance, evaluation, sustainability & preparation for certification						
OUTPUT & RESULTS							
1 Report on Needs & State of the Art 1 Conference Paper	Creation of I&E SIG ISPIM 2 Conference Papers 4 laboratory workshops & 8 prototyping workshops Dissemination on companies' & ISPIM websites		2 Academic Journal Papers 2 Conference Papers 8 training workshops & 1 launch I&E module Dissemination on companies' & ISPIM websites		Certified 6 ECTS Module Pedagogical materials OER: Innovation Portal Final Report		
Phase I: 6 month	Phase II: 12 month		Phase III: 12 month		Phase IV: 6 month		

that we are examining and developing inside the research project and work packages are described below.

## Project design

The project follows a threefold approach; research, teaching, and practice. Project design, or how and what TACIT is going to achieve is presented in the table below.

## The Eight Core Approaches

The work centres on eight core approaches from which teaching packages will be developed: storytelling, peripatetic learning, future-based learning, entrepreneurship laboratory, innovation theatre, innovation games, design making, and project based learning.

## Storytelling

All innovation projects, whether new concepts at the start-up stage of a new business or development projects within established organizations, require 'pitching' the idea to others to secure resources, commitment and support. This places emphasis on the need to develop a compelling narrative which can unfold as the innovation develops; recent years have seen an upsurge of interest in this approach and in the tools and techniques which can support it. How could we use the skills of storytelling to improve aspects of

innovation management? Making more persuasive pitches? Developing a storyboard for entrepreneurial ideas? Carrying forward useful innovation management lessons from past experience within the organization?

### **Walking the talk - peripatetic learning**

The great Greek philosopher Socrates had the idea which neuroscientists are now supporting we are receptive to ideas when we are moving. Couple that with a truism, that changing our context makes us see things differently and there is the basis for a new approach to learning about managing innovation. The core approach here is to use guided walks through landscapes which are full of examples of innovation and explore them whilst in the open air, walking and discussing them away from the classroom context.

### **Future-based learning**

Innovation is about creating alternative futures and a powerful set of tools exist around scenarios and other projective techniques; some of these have been embedded in powerful methodologies such as Shell's Game changer programme or the Future Agenda consortium. This strand of work will set up an IF-Lab (Imagining the Future-Laboratory) a place where participants imagine alternative futures and explore within them opportunities and challenges which can form the basis of novel product or service concepts. From these rich pictures tools for 'back-casting' and road-mapping can be used to develop clear pathways to take innovation opportunities forward.

### **Entrepreneur laboratory**

There's been an explosion of interest in start-ups and how to engage and enable new ventures. They involve developing novel value propositions and expanding them into robust business models which can realize the potential value for end users. Coupled with powerful new approaches around rapid prototyping of minimum viable products, getting early feedback to refine ideas and pivoting towards a solution they provide a fast track to developing and implementing innovation. But such 'boot camp' models aren't just relevant to start-ups and high tech enterprises. They can help existing organizations rethink how they come up with and carry forward business cases. Building on experience in companies like BMW, Nokia and Lego this strand of work will explore in a practical way how to bring the entrepreneurial lab into the mainstream.

### **Innovation theatre**

"All the world's a stage" as Shakespeare pointed out and one part of that stage is where the drama of innovation is being played out. So there is considerable scope for using not only the metaphor but also some of the tools and techniques from the world of theatre to explore the characters, scripts and scenery of innovation in different contexts and to develop new tools and approaches to working with innovation. In particular we will draw on experience at the University of Southern Denmark which has worked for years

on using theatre-based approaches to improve understanding and performance in real organizations.

### **Innovation games**

Play and playfulness are increasingly being recognised as powerful aids to creativity and innovation. The concept of serious play reflects this growing interest and this strand of work will explore the different ways in which games and structured play can provide new learning opportunities to develop innovation capabilities. These might range from simple live exercises through to more structured interactions and even online and virtual world gaming.

### **Design making**

Design thinking has become one of the hot topics in the innovation field in recent years, reflecting both an approach to solving problems and a wide-ranging toolkit which people can use to embrace design methods. Organizations like IDEO have demonstrated the potential of this model in a variety of public and private sector innovation contexts and it brings important new perspectives especially around user understanding and prototyping. This strand of work not only seeks to explore the ways in which design thinking can be used in learning how to manage innovation more effectively but also looks at design making the range of approaches which enable user engagement in prototyping and concept testing of various kinds.

### **Project-based learning**

Innovation isn't an academic or theoretical matter it's the practice of turning ideas into value. And much of what we've learned has come from reflecting on projects successful or otherwise and pulling out relevant lessons. This strand of work will look at the ways in which structured reflection can be used to capture learning from live innovation projects, and also how we can design reflection projects to help assess and enhance innovation management capability.

### **The Work Packages**

The project is being delivered through a series of work packages with the following objectives:

- A review of existing experience across the project consortium in Innovation & Entrepreneurship (IE) education/training provision.
- To explore, develop and test complementary methods for this.
- Specifically explore with project partners eight key areas:
  - Storytelling developing a coherent innovation narrative linked to suitable boundary objects such as the Business Model Canvas, Lego Serious Play and other platforms
  - Project-based learning, using live innovation challenges as a device to integrate key tools and concepts around IE

- Innovation theatre, using formal approaches including role play and simulation to explore perspectives and challenges in innovation
- Entrepreneur laboratory, using tools and techniques from lean start-up and developing/testing innovation concepts through agile processes such as minimum viable product
- Futures-based learning through simulation, scenario development and Game changer techniques
- Peripatetic learning, using a Socratic approach to exploring landscapes and artefacts which can be used to illustrate core concepts in managing innovation
- Design thinking drawing on the growing resource and practice base around user-centred high engagement processes for innovation to articulate and prototype in context
- Innovation games working with the concept of serious play and enabling learning through a variety of settings from simple workshop experiences through to extended structured games.
- Development of a robust methodology and a toolbox of options to support its implementation.
- The building of a community of practice around IE education and training involving practitioners, policy-makers, researchers, consultants and academics.
- To create and certify a 6 points European Credit Transfer System (ECTS) module which can be used in award-bearing programmes across Europe.
- Creation and maintenance of an open-source version of the toolbox of novel learning approaches

## **Discussion**

The needs and requirements for education are permanently evolving, and the project is exploring needs, resources, and experience on both the supply and demand side to build up a clear understanding of where and how delivery could be improved around innovation and entrepreneurship.

The novel modes of teaching outlined above all have a respected pedagogical foundation and have already been tested in pilot form as part of TACIT knowledge alliance. Participating partners are already gaining understanding by working individually on the individual approaches. Results will be reported during the course of the 3-year project.

The experience base of the project partners has already provided a rich perspective on the strengths and weaknesses of current education and training provision in the field of innovation and entrepreneurship. The need for project and practice-centred modes of working and for novel approaches to delivery, which challenge individuals and develop capacity for action at that level has been highlighted. Our project builds on this, developing and prototyping a series of novel approaches to delivery, targeted at developing tacit knowledge and skills in innovation and entrepreneurship, recognizing the limits of conventional approaches to education and training around innovation and entrepreneurship. In particular, more needs to be done to develop individual capacity for action through acquiring tacit knowledge. We argue this can be delivered through mechanisms which meet needs for:

- project-based learning, linked to the real challenges participants face in trying to make innovation happen
- recognition that different modes of learning; for many practitioners classroom style theory-based approaches do not work effectively
- experiential learning, offering different ways of closing the learning cycle between theory and practice
- skills-based learning, placing emphasis on what individuals working in organizations can actually do, rather than focusing only on structures and processes to enable innovation
- practice-based learning, allowing experimentation and gradual capability development through prototyping
- building understanding of core principles around which individuals can configure solutions to the innovation challenge which work in their particular context

The project will capitalize on the shift in thinking towards new modes of delivery (e.g., the flipped classroom and the shift to massive open online courses (MOOCs)).

In terms of the wider benefit to enterprises, we recognize that innovation lies at the heart of what they do, from the initial stages of start-up through to the difficulties of building on their original ideas and developing new offerings, improving their processes, opening up new markets or creating more value. The challenge of establishing a healthy business able to repeat the innovation trick and deliver a steady stream of change depends not on luck but on the ability to understand and enact innovation. Meeting this challenge requires learning and capacity building around entrepreneurship skills, and requires us to further develop our understanding of how to teach innovation and entrepreneurship effectively such that our teaching enables learners to put the lessons into practice.

The opportunity for public and private sectors to work together is of great potential benefit, and the inclusion of a UK NHS partner, South Devon Healthcare Trust, in the TACIT project is interesting at a time when delivery of value healthcare is a global challenge. This organisation created a partnership with Nanyuki & Nyahururu government hospitals in Laikipia County, Kenya in 2009 and this partnership offers a unique opportunity to test the learning from the TACIT project in very different settings. Both the UK and Kenya governments have written strategies to address innovation and improvement but implementation remains a challenge.

While Continuous Quality Improvement (CQI) strategies are well known and can be taught, practical tools & techniques to stimulate more radical innovative thinking and to develop the ability of a workforce to really create value from their good ideas, have not previously been described, despite a plethora of educational material on the subject.

Outputs from the TACIT project will provide tools that will help to engage individuals in developing their personal skills to support change in any organization and improve their ability to act for the ultimate benefit of their organizations and their clients.

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*Creating Novel Approaches to Developing Tacit Knowledge and Skills in Innovation Management.*

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# A Designers Experiences and Embedment in Context for Innovation Toward Glocalisation: A case of SafariSeat Wheelchair Design

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## **Abstract**

This paper explores a case study of how a designer's experiences and embedment in context influenced the innovative designing of a low cost, all-terrain and open source wheelchair particularly for use in developing countries. The desktop research reveals how experiences as a user, and his exposure as a designer through interaction, immobility and knowledge of the Kenyan environment influenced his actions and thoughts to innovation aimed at change. The research further makes reference to an alternate innovative concept design approach meant to achieve a suitable product for developing countries. The paper discusses the designer-user versus the parachute designer and their product success in terms of use and functionality of their product innovation. In conclusion this paper shows that the embedment in context, experience and open-source make a designer-user better placed than a parachute designer within the confines of Glocalisation.

**Relevance to Innovation.** The innovation is seen through the use of the designer-user method which was applied to inform design solutions. The product, an all-terrain SafariSeat wheelchair was influenced by the designer-user experiences informed by actions, experiences, thoughts and embedment. This case exemplars show of how the designer-user experience can prompt innovative thinking. Local experiences and understanding of the nature of needs as well as resources, knowledge and exposure from the global scene can achieve sustainable glocalized solutions.

**Keywords.** Design, Design-User, Experiences, Innovation, Parachute-Designer

## **7.1 Introduction**

In today's world, human experiences both in the formal and informal learning environments impact on our actions, which subsequently shape learning. Reflecting on the thoughts of Richard Buchanan with regard to better design thinking; activities and

organized services contribute to achieving an organic flow of experience in concrete situations, making them more intelligent, meaningful and satisfying.

In discussion on Empathic Design research McDonagh writes that Design is becoming less about products and more about generating positive experiences for users. We need to understand needs beyond the functional in order to develop more appropriate design outcomes. What is emerging is the importance of shared understanding, empathy and emotion within the designing process.

Empathic design is a design research approach that is directed towards building creative understanding of users and their everyday lives for new product development (NPD). Creative understanding is the combination of a rich, cognitive and affective understanding, and the ability to translate this understanding into user-centered products and services (Wright & McCarthy, 2005).

It draws on information about the user and his/her everyday life, and it includes inspiration for design and empathy, or a feel for the user (Postma, Lauche, & Stappers, 2009). The empathic design approach is considered most valuable in the early stages of NPD, when product opportunities need to be identified and product concepts developed (Koskinen & Battarbee, 2003).

Experiences and embedment in context of a designer further ensures that they are able to have a shared understanding of the needs of a user. At the same time the designer who in this case is emotionally involved gains empathy being in the situation and becomes not only a designer but a user too. The designer-user is thus described as a local based designer who has the knowledge of the environment he lives in and has gained experience of user needs.

The designer-user who is now more empathic can relate to an actual real case known to him to further put forth his innovation. He considers criteria (informed by his experiences and embedment) that inform more towards a concrete solution.

Enzo Manzini discusses this as Design Orienting Scenarios that are based on real concrete cases that meet a set of criteria. The scenario building process is based on some concrete, real cases that meet a set of general criteria they are conceived as tools to be used in design processes.

How does a designer formulate a role as a change agent and determine a course of action? To do so means to consider both the past and the present, are embodied in concrete activities and artifacts. From the dialectic of past and present come the situations that determine the possibilities for the future. To plan effectively in the present requires a vision of what the future could and should be. The use of both the conditional could and the prescriptive should to suggest, in the first case, that the future is always based on the contingency of human choices and, in the second, to assert that these choices need to be driven by a consideration of what ought to be done.

The designer-user method explains how the specific Design Orienting Scenario brought out the needs from knowledge and experiences gathered in the past and these informed on what the solutions could be as well as choices on what ought to be done in regards to solutions for the future.

In context of the design processes and product development, the products made for users have always been informed by user needs to meet functionality. Research informs on the specific needs of a target user and probable solutions are then sought. This means

that a designer may understand needs from a general perspective, leading to designing for generalized solutions. Globally, the needs for specific users can be viewed as similar but in the local context, the solutions presented are never identical.

It has been argued that wherever globalization has effects, the form these effects take will depend on the particular setting or context. Some authors have called this convergence of global dynamics and local contexts glocalisation. Glocalisation expresses the way globalization dynamics are always reinterpreted locally, leading to an interpenetration of the local and global scales that creates context-dependent outcomes. It may be considered that glocalisation is the way that globalization really operates (Backhaus, 2003; Robertson, 1992, Swyngedouw, 1997; Swyngedouw, 2004).

Western based designers often use research to understand the needs of specific communities. The products that they design may however not be practical or efficient for the user on the ground due to various local dynamics. Global thinking methods, technology, materials and solutions are often incorporated in the design of the product.

The Parachute designer is one who introduces their product developed in the western world for use in the developing world but it is not sufficiently functional. It is assumed that the knowledge and research input the product will work well for the local user. However the designer is not informed from knowledge gained from user experience or from being embedded in context as a local.

In this paper an exemplar is discussed where a wheelchair is made in the USA for use developing countries. From research various criteria of the developing countries gathered were considered. These include; mobility needs of the user, rough terrain, materials availability and durability. The designer develops the prototype of the product and does the first test trial in the USA. The second test trial is done in a developing country and the results shows some criteria considered for the developing countries product was not practical but was useful for the western world users.

## **7.2 Mobility and Accessibility for Persons with Disabilities**

A person's environment has a huge impact on the experiences and the extent of disability that one may. Inaccessible environments create disability by creating barriers to participation and inclusion for Persons with Disabilities (PwDs). Many wheelchairs are donated to the less-resourced countries by well-meaning organizations with little or no regard to prevailing local, environmental cultural and physical conditions and without ensuring appropriate knowledge tools and support are present. Arguably, wheelchair design and maintenance condition is known to impact the performance of wheelchair users and consequently their participation and ability to carry out the tasks of daily life (Gorce, 2012).

A global analysis of the role of disability in low income countries indicates that there has been a dependency upon donated or imported wheelchairs which have been designed for a developed environment. They are frequently distributed at shows which serves the interest of the donor rather than the wheelchair user. This reflects a commitment by the

donor to the charity model of disability, where the size and design of the wheelchair is decided by the product provider and not by the user.

Historically most wheelchair provision has focused on the product in isolation from the actual user; their specific impairment, size, lifestyle and living environment rarely taken into consideration, which often ends up in timeworn product conditions serious illness from infection owing to pressure sores. Majority of donated wheelchairs are totally unsuitable for the users needs and often provide them with greater dependence upon others and continued immobility. Many such wheelchairs are unable to withstand the harsh unpaved terrain and cannot be repaired locally.

The lack of suitability of use for the right mobility aids is a further impediment to PwDs in the local context. It thus brings in the need of developing the right wheelchair which is appropriate, affordable and accessible. This means that it will not only solve the mobility challenges experienced from the local terrain but it can be built from locally available materials, local workshops for the convenience of ease of repair and maintenance.

The International Labour Organization (ILO) reports that the unemployment rates of people with disabilities reach an estimated 80% or more in many developing countries. Government funding for the provision of a wheelchair is rarely available, leaving the majority of users unable to pay for a wheelchair themselves. Many users are poor and they live in small houses with inaccessible surroundings. They also live where road systems are poor, there is a lack of pavements, and the climate and physical terrain are often extreme. In many contexts, public and private buildings are difficult to access in a wheelchair. These physical barriers place additional requirements on the strength and durability of wheelchairs. They also require that users exercise a high degree of skill if they are to be mobile. Users face a range of challenges, which must be considered when developing approaches to wheelchair provision. 80% of the people with disabilities in the world live in low-income countries (WHO, 2008).

Persons with different Physical Disabilities in Kenya use wheelchairs that provide mobility. This is more often seen in homes and for the few fortunate, at their work stations. The wheelchairs are able to enhance their abilities as workers and enable the PwDs to be a fully integrated member of the community. Four point six percent (4.6%) of Kenyans experience some form of disability with many of the disabled persons residing in rural areas. The accessibility of the immediate surroundings plays an important role in PwDs participation in various activities. In a survey, 65% of PwDs mentioned the environment as a major problem in their daily lives. It was also noted that nine in ten PwDs found disability without assistive devices a big problem (KNSPWD, 2008).

Lack of appropriate assistive devices hinders mobility and opportunity for integration in the community for PwDs given their daily activities. Function in a wheelchair is influenced by wheelchair design. Design features must be matched to the user's functional ability and posture support needs, and also to the environmental and durability requirements. Achieving an ideal match between user, wheelchair design and environment might be as difficult as it is important (Di Marco, Russel & Masters 2003).

### **7.2.1 Personal Experiences Influencing Design Decisions**

As designers, we often think of simple, beautiful, and easy to use features of a product, that makes the user's life easier. Nikkel Blaase, a user experience (UX) designer argues that as a matter of fact, features are merely a small, fragile part of the product. They are only a few of many thinkable solutions for a user's problem the product tries to solve. He mentions that a product has a core user experience, which is basically the reason the product exists. It fulfills a need or solves a problem people have.

By that, it becomes meaningful and provides a certain value. If the problem is non-existent, or the solution doesn't fit to the problem, the product becomes meaningless and people won't use the product; which in turn leads to the downfall of the product. Wrong solutions can be fixed, but non-existent problems aren't adjustable at all. So, how can we be sure to tackle a real problem? We can't be 100% sure, but we can minimize the risk a lot by observing and talking to people. Hence, uncovering the problem and building solutions customers really want. Not only can the existing problems be solved by observing and talking to people but can be informed by experiences, further reducing the risk of wrong solutions.

The design process has often started with inspiration and is purpose driven to solve a certain problem. Blaase highlights the Problem-fit solution that sees products become meaningful when the provided solution fits the uncovered problem. This solution describes the way a problem will be solved. Thus, the problem-solution-fit defines the core user experience of a product. The concrete features extend this experience and support the core experience, but they cannot replace it. Interaction Design and Visual Design can make a product beautiful, easy-to-use, and delightful or make it stand out in the competition, though it can't make the product meaningful. This is why a proper problem-solution-fit is so critical for the success of a product.

Janna Deeble, a fit and active industrial design student in the UK suffered an injury when a broken leg left him dependent on a wheelchair. In 2013 he was immobilized for several months and got a first-hand experience of using a poorly designed wheelchair in San Francisco. He explains that even in a city designed for wheelchair use with kerb cutouts and ramps and lifts it was infuriating I got stuck the whole time and my wheelchair was just useless. The designer explains that his own experience led him to think well, if I'm experiencing these problems here, how bad must it be for Letu?" Frustrating experiences as a user led to redesign of the traditional wheelchair to the SafariSeat, an off-road hand-powered wheelchair.

Janna had grown up in Kenya and as a child he had interacted with Letu, a Samburu tribesman disabled by Polio living an isolated, traditional lifestyle. People such as Letu, who live in poverty at the same time having a disability, are caught in a vicious cycle; which is almost impossible to break out of. After receiving a donated wheelchair from a charitable organization, Letu thought he was lucky, but his hope was short-lived, as the wheelchair was not designed for the rough terrain where he lived and hence was non-functional. When it broke down, he discovered it could not be easily or affordably repaired locally, so the donated chair quickly became redundant. This meant that he was not able to perform some of the daily activities due to his mobility challenges.

## **7.3 Wheelchairs for developing countries**

### **7.3.1 SafariSeat**

Janna Deeble grew up in Kenya and interacted with a Person with Disability living an isolated lifestyle in a Samburu village. Having experienced similar challenges himself for a period of time due to an accident, he was determined to make a difference for disabled people in developing countries. Information from the online outreach program explains that SafariSeat is a wheelchair designed for people in developing countries. What makes the product unique is the fact that it's made from local materials and bike parts which means that anyone will be able to fix it.

Secondly the wheelchair is incredibly good off-road. It has a mechanism which mimics car suspension meaning that all wheels remain on the ground for maximum stability. Deeble says the patent pending design improves the biomechanical efficiency of wheelchairs, using two levers for power and speed, and will help more than just its user. SafariSeat benefits people by giving them independence through mobility and this allows them to take care of their kids, to get jobs, to become active members of society. And really mobility is far more than movement. It is the key that unlocks access to a life beyond the confines of your own home.

Currently in East Africa hand-powered tricycles, which are preferred if the user has adequate torso stability, are more efficient to propel than a wheelchair, but are difficult to maneuver through sand and up steep hills and are much too large to use within the home. Other challenges include difficulties in maneuvering at corners and bends, fitting into standard doorways and speed, which is ultimately dependent on user propelling ability. These are some of the problems the design of the SafariSeat is seen to have addressed.

Another most important aspect is that its open-source which means that anyone in the world will be able to take the designs and build SafariSeats for their community. This will work in two ways; helping people with disabilities and creating jobs for local people Janna's design team plan is to make SafariSeat blueprints 'open source' to make the biggest impact and help as many people as possible. "Open Source means that the designs will be totally free and we're doing this because we want SafariSeat to help as many people as possible.

A Kickstarter campaign has raised more than 90,000 pounds (\$115,000) with 70 percent of that money going on development and manufacture of SafariSeats and the open source toolkit. "We're raising funds on Kickstarter to do two things. The first is to make as many SafariSeats as possible and the second is to translate the blueprints into an easy to understand manual that will use diagrams to transcend language barriers meaning that anyone will be able to build it, no matter where they live, no matter what language they speak," Deeble explains.

### **7.3.2 Leveraged Freedom Chair (LCF)**

Similarly, a concept for a wheelchair suitable for use in developing countries had been developed by Massachusetts Institute of Technology (MIT) in 2009 .Leveraged Freedom Chair (LFC), a wheelchair-based mobility aid capable of navigating virtually any terrain,

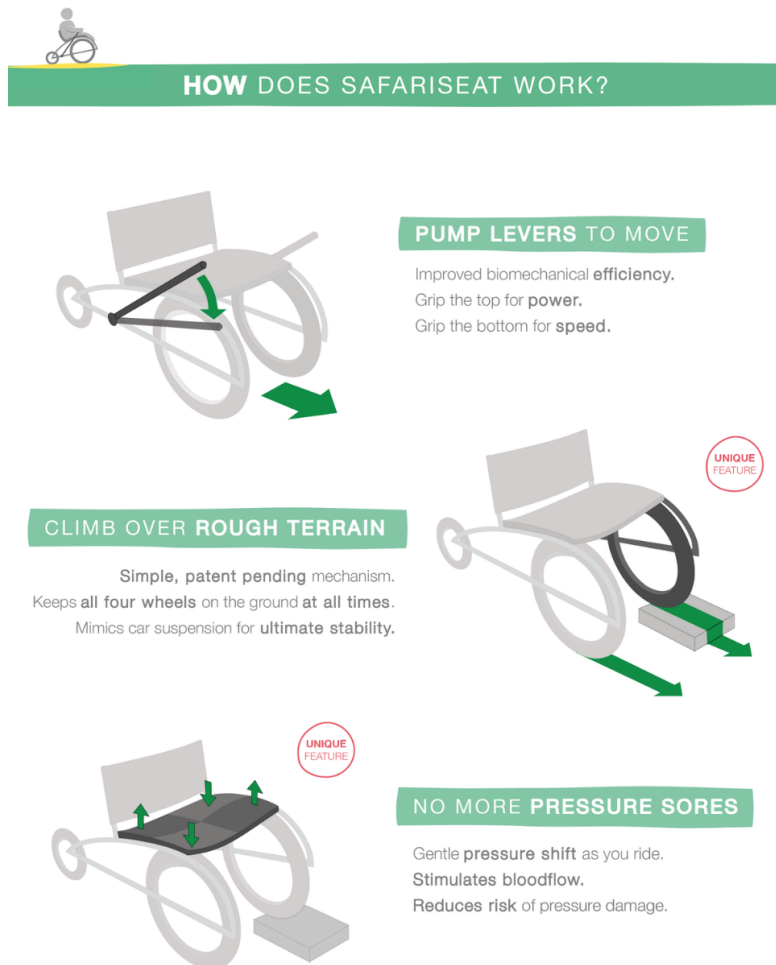


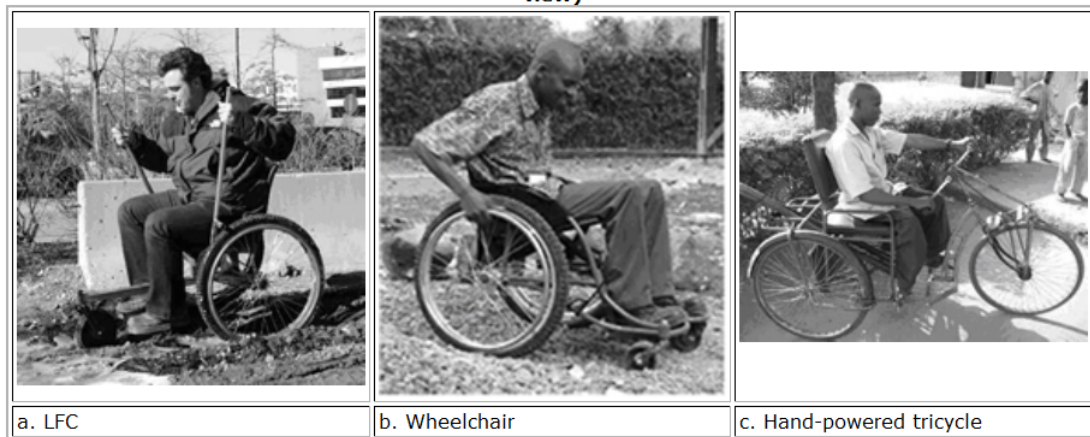
Figure 1. Features of the SafariSeat

from rural walking paths to within the home, by optimally utilizing upper body power for propulsion through a variable-speed lever drivetrain. Instead of using multiple gears to change speed, the user varies mechanical advantage by sliding his hands up and down the levers.

Changing user geometry instead of machine geometry enables the lever system to be made from a simple assembly of low-cost bicycle parts. This insures the LFC can be manufactured and repaired anywhere in the developing world. The motivation behind this project is to provide mobility to people with disabilities in developing countries no matter their location, travel requirements, or local environment.

The Leveraged Freedom Chair (LFC), shown in Figure 2a, is a wheelchair-based mobility aid that can be made anywhere in the world with off-the-shelf bicycle parts and cope with varied terrain ranging from steep hills to sandy roads to muddy walking paths. For indoor use, the LFC can operate as a regular push rim wheelchair by simply removing the levers.





**Figure 2. The LFC compared to mobility aids currently available in developing countries**

A mobility aid that can meet these requirements is desperately needed, as 20 million people in the developing world require a wheelchair but only about five percent actually have one. Products that are currently available in developing countries cannot fulfill the wide usage needs of the disabled. In his 2010 conference proceedings, Winter discussed the conventional western-styled wheelchairs, as shown in Figure 2b, are inefficient to propel and are exhausting to use for long distances on rough roads.

It was noted that Hand-powered tricycles (Figure 2c), which are preferred if the user has adequate torso stability are more efficient to propel than a wheelchair and cost less due to the incorporation of standardized bicycle components. Unfortunately, tricycles are difficult to maneuver through sand and up steep hills, and are much too large to use within the home (Amos G. Winter, V, Mario A. et al. 2010).

The wheelchair was first tested at a course on the MIT grounds and later in 2010 in East Africa. What they learned is that although the LFC is more efficient than a regular wheelchair for plowing through mud and over big stones, it is still too wide and heavy. The chair required to be lighter in addition to reducing the width and weight. Winter alongside a team would focus on improving the LFC for indoor use so that it functions just as well as a normal wheelchair when the levers are removed.

He uses the desk chair/mountain bike analogy to describe how the LFC is intended to be used all day. Although someone might spend many hours each day sitting in a desk chair, it would be horrible to use that chair to commute to work, especially if the commute involved dirt roads. Similarly, while the mountain bike would be great for the commute, it would be awkward and uncomfortable to sit on all day at the office. What we have now is an LFC that is great off-road and is comfortable to sit on, but is still too big to comfortably use indoors.

## **7.4 Discussions and Conclusions**

Whirlwind wheelchair designer and expert Matt McCambridge commends the simplicity of the LFC design, but says he has been most impressed with the intentionally slow, methodical implementation of the LFC. He praised Winter for conducting user testing early, rather than inventing something in the lab, then using donor money to make thousands of them and forcing them on disabled people who really have no option but to smile and say, thank you. This approach amicably reminiscence of having parachute designers- foreign designers who provide global solutions unsuitable for the local setting. However the process continues slowly and is dependent on funding for testing of prototypes in the local setting and in research towards developing the manufacturing equipment that will be used to build the chairs for large-scale production. This are challenges that have been overcome by the SafariSeat Team through a glocalized approach.

Arguably feedback can be obtained from designer/user experiences in the local setting where the designer embedded in context influencing the solutions. This is best seen in the case setting of the SafariSeat where the designer becomes the user. He further incorporates these experiences, the challenges faced firsthand with the knowledge of the local terrain where he has lived. The designer as a professional has acquired global thinking in terms of knowledge and training as a design student at a foreign university.

Janna who a member of the Kenyan based social enterprise design team Uji considers higher level inclusion such as geography and economics to be just as important as the inclusion of specific individuals needs. Co-founder Cara O'Sullivan emphasizes that There is great power in being able to understand how one another feels and to have true empathy for those with backgrounds different to our own. Our beliefs, our habits, our unique abilities; diversity is life's greatest asset, which makes inclusion one of our greatest design challenges, At the same time Janna who conceived the idea of the SafariSeat having grown up in rural Kenya alongside local people best understands from experience the reality of being a physically challenged person.

The SafariSeat design team emphasizes getting to know people as people, not just as users. They practice Open design which is empowering, inclusive and ethically sound and argue that it creates a better product by building on ideas and experience as explained by Janna. Uji carries the ethos that product design should ideally result in a flexible solution: something intended to be adapted to its context to suit different cultures and environments accordingly, similar to nature's own design process. This philosophy stems from the organization's conscious effort to avoid fuelling a dependency culture. Having understood not only the geography but the economic situation most users are in in Kenya, the innovation for this wheelchair includes the practicability of materials, manufacture and maintenance options.

The innovation is seen to have considered the use of local bicycle parts that are available for use in the manufacture, local workshops have been selected to manufacture, repair and provide maintenance for the wheelchairs and the design blueprints have made open source to be freely shared. These APDK workshops have invaluable expertise in local manufacturing techniques, locally available materials and supply chain management. The expertise from such organizations is essential for making products suitable for sustained long-term use.

Innovations such as these go to show further how a designer-user has used the global thinking, knowledge and technology. It is combined with experiences and embedment in context to create a product that provides practical, functional and affordable solutions for the local user. Not only do the PWDs benefit from accessing a suitable and affordable wheelchair, as well as giving the local workshops an opportunity to create revenue through the manufacture of the wheelchairs with no hindrances to technology or materials. This can be argued as designer-user method further influencing the dynamics of Globalisation. The designer-user method ensures that the user needs to be addressed are best understood due to three facts. First, the designer has experienced by been in the same situation of need. Secondly, being embedded in context is a further advantage in knowing and thirdly, adopting an open-source option of thinking that works for wellbeing of the users and their communities. This brings forth the discussion of a designer-user being a better placed designer in the local context as opposed to the parachute-designer.

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# Collaborating for Collective Value: a Mentoring Perspective

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## Abstract

Innovation today is seen to be driven by the cooperation between individuals in innovation ecosystems, but significant inertia, sub-optimal structures and understanding of how and why collaboration is practiced in many cases blocks innovation. In this conceptual and exploratory paper we argue that achieving high value added innovation requires mentored transitions through which low value market pricing relational models are replaced by communal sharing ones that enable high joint value creation. Through relational models and stakeholder theory and three illustrative case studies, we propose that design thinking methods can support these mentored transitions through the development of individual and social capabilities, enabling integrating, translating and expanding roles in the mentoring process. The paper contributes to the knowledge and application of relational models in innovation ecosystems through the mentoring perspective and the application of design thinking in developing high value added innovations.

**Relevance to innovation** The paper contributes to creating high value added innovation through the knowledge and application of relational models and stakeholder theory in innovation ecosystems. The mentoring perspective is a valuable conceptual addition to emerging innovation management practices. The application of design thinking in this context contributes not only to the methodological toolkit needed to create high value added innovations, but also the development of skills and roles for the 21st century mindset.

**Keywords.** Collaboration, Design Thinking, Innovation Ecosystems, Relational Models, Stakeholder Theory

## Introduction

Currently popular management visions of agile, silo-breaking organisations have painted a picture of a more effective, creative economy - one better equipped to address complex challenges and to produce innovations of deep societal value. As both public and private

organisations move away from traditional single actor or entrepreneur<sup>1</sup> driven transactions into collaborative work and shared value creation in ecosystems, proposals have been made that the established logic inherent in programmes, interventions, organisational processes and relational positions between stakeholders is also changing. Work within shifting organisational settings and collaboration between individuals is seen to be replacing stand-alone interventions as the core model for turning inventions into successful and useful innovations - ones that create (or are expected to create) significant shared value for the set of participants. We would like to be witnessing such collective sense-making and solution-seeking leading the way towards multi-stakeholder collaborations in thriving innovation ecosystems, creating shared value on a broad societal or global scale. And we do note that an increasing number of actors (individuals and organisations) take the collaborative proposition seriously: silo-breaking and agile collaboration aim toward collective value creation and the discovery of qualitatively better solutions for all. This perceptual shift is associated to a conceptual change, the gradual reconfiguration of organisational and functional boundaries, of the relations between 'us' and 'them', and of the role an organisation or a project should play in a larger scheme of things.

However, in practice we keep encountering examples of confusing organisational change processes, extensive amounts of varied, but shallow interactions, and new market products and services that do not address critical social, economic and environmental challenges and fail to generate truly meaningful knowledge exchanges between participants. The problem is that while the language of management and of emerging organisational practices emphasises collaboration, co-creation and the building of shared value, the activities themselves are often implemented in a context driven by the same old drivers: competition, quick wins, networking, deal-making (devising simplistic win-win strategies), tit-for-tat rules, etc, all in service of predefined organisational performance indicators. It could be argued that in large part current collaborative management approaches are actually an extension of traditional self-interested organisational practice, only applied to an environment of rapid changes and high transaction levels.

The difference between innovation talk and practice has not gone unnoticed, and extensive attention has been paid to advocating the value of collaboration and exploring ways to shift transactional practices toward collaborative ones. Perhaps the best known example over the last decade has been the spread of design thinking in management, building on co-creation practices to join technological, economic and human factors into a mix that aims to generate breakthrough solutions based on shared value and shared knowledge. Another line of enquiry, economic stakeholder theory and relational theory provide a useful perspective on the conceptual shift entailed by this increased focus on collaborative work. Findings point to the importance of relations between stakeholders as important underlying drivers of individuals' participation in joint value creation, thus either helping or limiting the extent to which collective value can be achieved through cooperation. In particular, the recent research of Bridoux and Stoelhorst (2016) explores how the creation of joint value in organisations is affected by the relational styles these organisations advocate. This approach identifies implicit conceptual frames through

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<sup>1</sup>If we think about the early Schumpeterian definitions of innovation, the driver was the entrepreneur. Today, most often organisations drive innovation (Schumpeter, 1983).

which individuals perceive their relations to each other, and links the application of these frames to organisations' ability to solve public good dilemmas.

This lacking depth in collaboration translates in a limited ability of stakeholders in innovation ecosystems to meaningfully contribute to collective value, and thus to reach the breakthrough results they set out to achieve. Bridoux and Stoelhorst (2016) define joint value creation as "value creation processes involving multiple parties, within and/or across the firm's boundaries, who face high task and outcome interdependence in providing mutually supportive contributions to value creation". Two main contributing factors emerge: In the first place, ecosystem environments are premised on a market transaction model, which limits inclusivity on a larger scale. Secondly, the collaborative capabilities and practices of participants are often lacking. In this paper we focus on the latter theme, asking ourselves: *how can we apply the theory of relational models to collaboration in innovation ecosystems, and how can we foster the needed relational capabilities in practice?*

We initially build upon the behavioral stakeholder theory and relational model of Bridoux and Stoelhorst, recognizing that collaborative models of interaction are more effective at generating joint value than purely transactional models. We then examine innovation ecosystems as the wide systems within which collaboration is currently understood to take place. They are defined by Autio and Thomas (2014, p. 205) as "a network of interconnected organizations, connected to a focal firm or a platform, that incorporates both production and use side participants and creates and appropriates value through innovation." These complex networks of interdependent actors, business enterprises, knowledge creators, not-for-profits and public sector agents form the foundational layers on which single organisations operate in various roles. We proceed to discuss design thinking as an approach that can assist in bridging the gap from transactional models to collaborative ones, with a focus on a mentoring strategy of enhancing individual and social capabilities and of mediating between the relational models used by actors in ecosystems. Finally, we take a preliminary look at the influence of relational models through three recent short illustrative case examples, in which a reorganisation of stakeholder positions and collaborative practices has been attempted.

In this conceptual and exploratory paper we contribute to the discussion on what is referred to as a collaborative 21st century mindset. We provide an initial contextualization of the relational models proposed by Bridoux and Stoelhorst, exploring the relevance of relational model change from market transaction to collaborative framings in innovation ecosystems. We continue by charting the opportunities that design thinking approaches, tools and methods can have in supporting this change in practice.

## **Relational models in stakeholder theory**

In this paper we draw from Bridoux and Stoelhorst's analysis of relational models in order to focus our attention on the often lacking quality of collaboration and shared value creation, asking whether these might be improved through a reframing of stakeholder relations. The perspective is especially interesting when we seek to understand why collaborative, co-creative, cooperative practices often fail to succeed even though their



value may be recognized.

Building on Fiske's relational models theory (Fiske, 2012), Bridoux and Stoelhorst present four distinct models to describe how individuals relate to each other in collaborative environments. These four models are presented as generic, often implicit frames according to which individuals make sense of their relations to others, and based on which they assume certain ground rules related to cooperation, motivation and decision-making.

In Communal Sharing (CS), actors see themselves and others as members of a community and as participants contributing to shared motivations and goals. They cooperate by pitching in whenever required, regardless of personal rewards. Decisions are preferably made by consensus, and resources divided based on need.

Authority Ranking (AR) describes contexts in which individuals are defined by their position in a hierarchy. Those in a superior position are expected to rest on a legitimate source of power, providing security and acting on behalf of those in a subordinate position. Decision-making is based on authority and resources and value created are divided according to status, with those in subordinate positions receiving less.

In Equality Matching (EM), actors perceive themselves to be in a reciprocal situation, in which each party is equal and contributions are expected to be balanced between participants. Fairness is portrayed in terms of equality, reciprocity and tit-for-tat types of rules.

The fourth model, Market Pricing (MP) portrays actors as they are most often viewed in economic contexts, as independent entities competing for achievement and motivated by self-interest. Their engagement with each other is transactional. Decisions are made individually and fairness is understood as the equitable distribution of resources to actors based on their contributions.

As we can see from Figure 1, the four relational models represent different joint value creation potential and degree of collaborative engagement. The three models of AR, EM and CS are collaborative ones, while the MP is an individual model. As Bridoux and Stoelhorst suggest, people's interpretation of what constitutes appropriate behaviour and which norms ought to be respected in interpersonal exchanges vary from one model of stakeholder relationships to the other. Expectations toward other people and motivations to contribute to joint value creation differ significantly across the four models. Some of them are more likely than others to lead to shared value creation, with the CS model channeling the most, and the MP model the least in joint contributions.

Another important aspect of stakeholder relationship models is that they are only vaguely recognised conceptual schemes. Unlike organisational roles or functions, they are often implicit and not articulated openly in stakeholder networks or within organisations. People may have different understandings about which model is predominant in which situation, and due to habit, organisational history or personal preference, individuals may have a tendency to interpret relational scenarios in terms of some of these models rather than others (Bridoux and Stoelhorst, 2016 and 2014, Fehr and Fischbacher 2002). Switching from one relational model to another - and thus profoundly altering the way a collaborative situation is perceived - is possible but requires significant adjustments.<sup>2</sup>

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<sup>2</sup>Bridoux and Stoelhorst argue that all individuals are capable of acting according to all four models although they are predisposed to use some models over others.

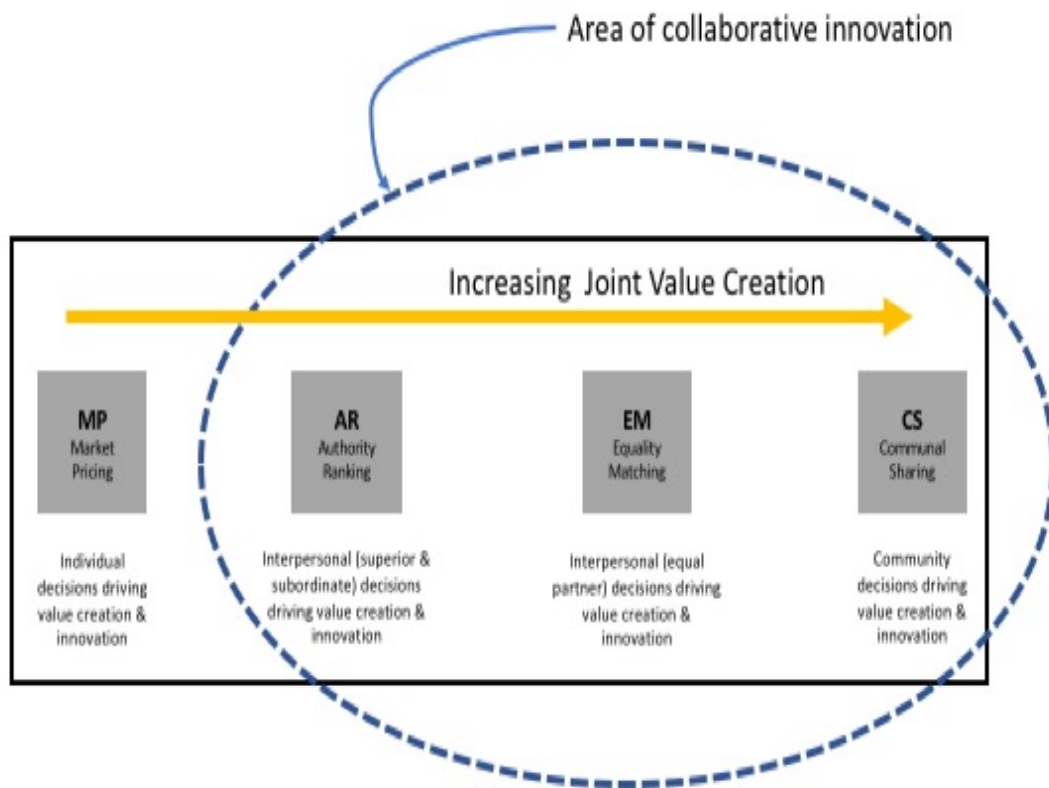


Figure 1. Joint Value Creation

Often this involves more than a simple choice, rather a reinterpretation of the entire context, and sometimes a complete reframing of the purpose of the organisation and its relation to the surrounding stakeholders.

Beside cultural factors (established assumptions and practice), influential individuals have a critical role in communicating the dominant relational attitudes within organisations and networks.<sup>3</sup> Though they are usually only tacitly communicated, relational models are often ingrained in organisations and other collectives. They affect behaviours, expectations, motivations and conceptualisations of value in the context of the organisation and of its stakeholders. Because each relational model encompasses its own logic of action and its principles for fairness, clashes between people's perceptions of which model ought to be applied in which context often become visible in the form of conflicts over what is considered right, fair or valuable. In cases where the parties do not perceive a situation in terms of the same relational model, this collision between basic assumptions governing action, motivation and expectations can be highly problematic and effectively impede meaningful cooperation.

<sup>3</sup> In the presence of both cooperative and self-interested subjects, subtle institutional details relayed by the organisation may cause large behavioural effects (Fehr and Fischbacher, 2002).

Because relational models are associated to different fairness principles, the legitimacy of an organisation's approach, purpose or culture depends on whether its stakeholders approve of the dominant relational model as a basis for action and share a similar understanding of the relational context in which it operates. Bridoux and Stoelhorst argue that in cases where stakeholders find that an organisation is using a different relational model than the one they themselves would use, the mismatch is experienced as a disturbing transgression. In such situations, the stakeholders would either adjust to the organisation's relational model or seek to disconnect themselves from the organisation. They also suggest that in order to avoid negative emotions associated with conflicts between relational models, it is more likely that over time stakeholders will switch to an MP model (which can accommodate self-interested behaviour, unlike the other models) rather than from MP to CS/AR/EM. This in other words signals that moving an organisation or cooperative situation from MP to other relational models, which would better support joint value creation, is a demanding exercise.

## **Innovation ecosystems and shared value**

Relational models do not exist in a vacuum. The concept of innovation ecosystems refers to constellations of actors who build on each others' activities in ways that help sustain the group as a whole, and lay the basis for the development and dissemination of new products and services - and this interaction is the basis of the relational models. The concept of innovation ecosystems is widely used with slightly different meanings, in essence it builds on the analogy from biological ecosystems: both are portrayed as dynamic and evolving, engaging a multitude of actors in multiple layers of intersecting transactions. While ecosystems are collectives with somewhat unclear boundaries, they are defined in terms of the benefits they provide to their participants. Often this implies a symbiotic relationship, where one both gives and gets valuable assets. While ecosystems can appear stable for long periods, their actors also have to be able to adapt, evolve, produce value, and be robust to accommodate sudden changes.<sup>4</sup> Moore<sup>5</sup> notes, there are identifiable phases in the growth, maturity, and restructuring of ecosystems, and sometimes entire systems disappear when external or internal shocks disturb the system past a tipping point.

An underlying difference between the notion of an ecosystem and various notions of social/societal collectives, is that ecosystem actors are portrayed as mostly disinterested in the system as a whole - they have individual, not collective aims, and pursue private gains by adjusting to their environment, but not aligning themselves with it. In this sense ecosystem actors form their private notions of value and associate themselves to other actors based on individual or shared interests. The default notion of individual action and motivation in economic theory takes self-interested transactions (as in the MP Market Pricing model) as a point of departure to explain human interactions in economic ecosystems.

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<sup>4</sup>See e.g. Moore (1993), Iansiti & Levian (2004a).

<sup>5</sup>James Moore was an early proponent of the business ecosystem thinking in his 1996 work *The Death of Competition: Leadership and Strategy in the Age of Business Ecosystems*.

As Bridoux and Stoelhorst note, a majority of individuals however have tendencies and preferences to (sometimes) use other relational models (CS, AR, EM) when interacting with other people. When applied to (economic) ecosystems, this suggestion calls into question their conceptualisation exclusively as groupings of actors disinterested in the system as a whole. Indeed, in comparison with biological models, ecosystem concepts referring to intentional human activity portray participants as more self-aware and purposeful regarding their actions and the functioning of the system. As the rhetoric of collaboration and co-creation becomes widespread, we can assume that some or many of the participants increasingly adopt a CS, AR or EM model to their participation in the system. As a consequence, notions of collective value arise, and the difference between an economic ecosystem and a social collective begins to blur.

One of these differences relates to the organisation and governance of the system. Governing mechanisms are created when actors perceive that the viability of the system as a whole requires facilitation. An established perspective on the difference between a market system and a societal entity is that the former is assumed to operate as an ecosystem of independent actors (oriented along an MP frame), and the latter serves notions of a collective organisation (oriented along CS, AR or EM frames). Whereas the MP-modeled ecosystem is assumed to operate mostly on a transactional level (or auto-guided by an invisible hand), the other models postulate both the existence of public goods and the need to collaborate on action and decision-making related to those public goods.

The boundaries between minimally facilitated MP-framed innovation ecosystems and more organised innovation ecosystems leaning toward CS, AR and EM models are further blurred in the context of ecosystem platforms and facilitators. Innovation ecosystems (Autio and Thomas, 2014) are often created and maintained around platforms, be they a focal firm or other organisation. This means that there is often a focal point that the ecosystem wraps around.<sup>6</sup> Unlike industrial clusters, innovation and industry networks or industrial value chains, innovation ecosystems are inclusive of broader agendas and integrate both the perspective of production and the perspective of the users. Accordingly, the ecosystem view represents a shift toward a more holistic framing encompassing the needs and motivations of a wide range of actors, and directs perceptions closer to the relational CS, ER and EM models rather than the MP model alone.

Although innovation ecosystems might continue to align closely to the MP model, the shift in rhetoric toward especially CS and EM frames is noticeable in the terminology and methodologies currently exploding in popularity in management approaches: co-creation, collaboration, facilitation, enabling, shared value or collective impact, to name a few. This change in language reflects a conceptual shift in how private actors in a market system are portrayed and how the relations between them are framed. Since cooperation is strongly belief-dependent and sensitive to how other actors are interpreted to be framing the relational situation, individuals change their course of actions and expectations based on the relational model that is being hinted at (Fehr and Fischbacher, 2002). This can be

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<sup>6</sup>As examples, Teece (2007) and Adner & Kapoor (2010) focus on the firm in the locality, while Moore (1993,1996) and Iansiti & Levian (2004a,b) focus on the 'hub' firm, and Gower and Cusumano (2002) focus on technology platforms.

highly consequential, since a shift in relational models also induces shifts in expectations of shared value, of appropriate behaviour and of the perceived principles of fairness in the situation. In the case of innovation ecosystems, the increasing use of collaborative concepts thus raises expectations of CS- and EM -type behaviour, which still often clashes with widespread MP- and AR- type organisational practices. The ensuing confusion poses a significant challenge to emerging cooperative initiatives, and highlights the need to develop both new organisational approaches to collaboration as well as the skills and capabilities required to bridge the gaps between clashing relational models.

In this changing market landscape, public and private organisations and to an increasing extent individuals are testing these collaborative notions in practice, raising questions on what are the skills and attitudes needed to collaborate in these new ecosystems, and how they could be developed successfully. In the next section, we propose that addressing the question of underlying relational models is key to making progress in this area.

## **Enabling relational shifts: a mentoring approach**

As innovation work becomes increasingly framed in terms of ecosystem activities, the value creation needs of organisations become more complex and comprehensive. Concurrently actors need to have the abilities to create value for users, customers and clients, as well as internal stakeholders and partners, the ecosystem and society at large.<sup>7</sup> They also need to master roles that enable them to do this.

In collaboration, people, ideas, and experiences meet and collide. An encounter of actors always produces some change or variation - a difference.<sup>8</sup> This difference is the important contribution in collaboration - it allows us to create the new, revise the old and see things from new perspectives - in other words it powers one key component of innovation, novelty.<sup>9</sup> While these encounters and their promise of novelty are appreciated, in practice actors in ecosystems often fail to genuinely build upon common ground. As discussed above, the ability of stakeholders to meaningfully contribute to collective value or to participate in its definition often remains limited. As ecosystem environments are usually premised on an MP model and thus not designed to function as decision-making collectives, there are numerous organisational, institutional or systemic barriers to participation and no established principle to ensure equity of participation. On the other hand, among those who do participate in collaborative ecosystem activities, we find numerous individual and practical limitations to effective participation.

In order to address the latter issue (the topic of this paper), we focus on the role of enablers - individuals, processes and organisations which take an active mentoring role in supporting others as they navigate across collaborative arrangements. We argue that this is not only a task consisting of managing complexity. It is also and perhaps most essentially a mediating role, alleviating confusion and conflicts arising from the

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<sup>7</sup>Den Ouden, E. (2011) builds up a case for multilevel and multi-area value creation in her *Innovation Design: Creating Value for People, Organizations, and Society*. Berlin:Springer.

<sup>8</sup>See e.g. Deleuze & Guattari (1994), on the concept of difference and affect.

<sup>9</sup>Innovation is seen to have the attributes of novelty, utility and success of some kind. A wide diffusion of ideas is as much a success as blockbuster sales.

collisions between relational models. Collective value creation depends on the alignment of stakeholders' motivational systems (Bridoux et al., 2011). Effective mediation addresses questions pertaining to the underlying relational models and creates opportunities to reconfigure the relational positions and motivational systems of stakeholders.

Under a general umbrella that we propose to call 'mentoring approaches', we take a preliminary look at what such a mentoring perspective could consist of: expanding the individual and social capabilities required to collaborate amidst such transitioning relational frameworks, as well as the tools, such as Design Thinking (DT), which can be applied to facilitate the development of these capabilities.

## **Capabilities**

The fast developing global work environment calls for very different skills and abilities than those that were valued in past decades. Flexible, open-minded, self-managing talents are in high demand, leadership moves toward coaching rather than authoritarian styles, and collaboration relies increasingly on network-centric initiatives (Nambisan and Sawhney, 2011).

The profile of sought skills and abilities reflects the transition from innovation clusters to ecosystems described above. As the innovation environment becomes more holistic, more focused on the creation of shared value, and actors more reliant on each other, successful initiatives no longer emerge from the Market Pricing model alone. Breakthroughs are sought in areas where multiple actors and agendas collide, and the skills to navigate in this environment and to operate in and between several relational models become essential.

On an individual level we can identify basic abilities required when transitioning from an MP model of cooperation toward joint value -driven styles. Self-reflection and awareness are intangible, but critical underlying factors of personal effectiveness in an evolving open-ended work environment. We propose that being able to identify the key issues at hand, being able to reflect on the plurality of views and actions of stakeholders and their relationships, and to address issues through alternative normative perspectives are essential aspects of this capability. We also find that there is a need to proactively position oneself and to assess one's own role, potential and abilities in the context of action. Last but not least, it is important to build individual motivation, personal interest and preparedness to contribute to joint value creation.

On another level, we also note that successful operation in innovation ecosystems requires social competences. This is particularly important since, as discussed above, innovation ecosystems rarely have organised decision-making structures or equitable avenues for participation. Effectiveness is highly contingent on social capabilities, such as awareness-raising, negotiating outcomes and being able to influence other individuals, organizations and communities to take action. There is also a need to be able to partner and collaborate in mutually beneficial ways with multiple actors to achieve wider impact, and to acquire the necessary influence to participate in decision-making.<sup>10</sup>

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<sup>10</sup>We build on the work of Sen and his Capability Approach on individual capabilities, see e.g. Sen, A. (2000) *Development as Freedom*, and the work of Stewart on social capabilities (also referred to as relational capabilities at times), see e.g. Stewart, (2013). Additionally see Subra et al. (2017) for a wide

Collaboration skills are highly intangible, and while there is a plethora of advice and best practices on the development of personal or social competences, there is little understanding of the challenges posed by collaboration between colliding relational systems, and the skills required to mediate between these perspectives.

This bridge-building activity has become ubiquitous in emerging innovation ecosystems, and it is performed by stakeholders such as mentors, innovation platforms, or public services among others. Along the transition from innovation clusters to ecosystems, and the concurrent need to shift to relational models more suited to collaboration and shared value creation, the role of enablers comes in high demand.

## **Mentoring Roles**

As innovation work evolves toward an ecosystem approach, the activities taking place in the system are increasingly perceived in terms of CS/EM/AR. This transition is taking place gradually in and between organisations, and it has given rise to numerous enabler roles.

This is particularly visible in cases where new collaborations need to be built. Much effort may be put into defining roles and responsibilities and agreeing on activities between stakeholders. Relational models on the other hand are rarely discussed upfront. They are more tacit, embedded in organisational cultures and practices and while they may be intuitively acknowledged, they are usually not part of established organisational concepts and discourse. Remaining thus underdefined, their influence on how the partners' roles are eventually performed and according to what logic of collaboration the stakeholders will tend to relate to each other can be insufficiently recognised.

As relational models remain thus underrecognized, individual contributions to broader shared goals can be reduced for motivational reasons, such as free-riding, insufficient incentives, feelings of unfairness and misaligned interests. Especially when faced with high task and outcome interdependence, some stakeholders will typically contribute to joint value creation, while others will pursue individual interests. This can quickly lead to an unraveling of collaborative efforts: if participants are unable to co-create value according to expectations, the high transaction costs of cooperation can no longer be justified.

In such cases the role of mediators can be decisive. We propose to consider these actors (facilitators, hubs, network nodes, services or coaches, to name just a few of the proliferating enabler roles) as central to the transitions between relational models applied by different stakeholders in innovation ecosystems. We highlight the role of mentoring as a decisive function in these transitions. Mentoring serves to integrate and translate between stakeholders and to expand the collaborative capabilities of partners. Crucially, such a mentoring approach assists partners in navigating between relational positions displayed by various counterparts and in reconfiguring those positions to reach better collaborative environments.

While evidently other mentoring roles also exist, we argue that the key functions of integrating, translating and expanding address the specific challenges of collaboration in

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discussion on framing the approaches, abilities and impact related to the development of youth as change agents.

innovation ecosystems. Integrating brings things together, translating helps to make sense of things and expanding creates the needed capabilities for improvement. Integrating is a complex task, as collaboration can be a transformative process that permanently alters not only the mutual activity, but the very nature of the players themselves (Hickey and Mohan, 2004). In the context of relational models it can be seen as the demanding task of reconfiguring a collective in which actors from various MP positions regroup as a relational unit, such as EM or CS. The translating function on the other hand assumes a deep understanding of both the global and local contexts in which the ecosystem operates, and involves facilitating and making sense of the knowledge and perspectives of stakeholders, helping to identify the most important issues that need to be communicated between actors. Finally expanding relates to the consolidation of synergies, skills and abilities through learning and longer-term development - a difficult task in an environment of fragmented and fast-paced initiatives.

## **Design Thinking**

Design thinking methodologies can be viewed as mentoring tools that are increasingly used to support ecosystem building and shared value generation. DT builds on creativity, innovation and human factor thinking, fusing designerly and analytic methods to develop new product, service and business concepts and solutions.<sup>11</sup> It is not new - Nigel Cross talked of 'designerly ways' already well over three decades ago (Cross, 2001), and Donald Schon of reflective practice and creativity (Schon,1983). Along other reasons for its current popularity, we suggest that DT approaches, methods and tools can assist in transitions from an MP operating environment toward reciprocal relational models (CS/EM/AR).

The key contribution from DT to shared value creation in innovation ecosystems lies in the power it has to enable collaboration, cutting across functions, organizations and cultures - Beside its use as a group of technical tools to develop user-centered innovations, knowingly or unintentionally DT approaches can be viewed as serving to induce relational shifts toward more collaborative work environments and more extensive joint value creation. DT -based facilitation typically disrupts or reorganises a collaborative environment, thus first unlocking and then helping to reconfigure the relational positions between the stakeholders.

As an approach, DT is ambiguous, optimistic, and exploratory. It employs abductive reasoning and reflective practice, reframing multiple viewpoints in order to find alternative ways to approach challenges. Through the collaboration of interdisciplinary teams, developers engage in user-centric and design-driven innovation. DT methods aim to build a deep and empathetic understanding of the desirability of the innovation from a human and contextual perspective. DT's emphasis is on arriving at the most meaningful and valued solutions that can be found, by employing a sensitising, iterative approach, testing products, services, and business models through visualizations, prototypes and user engagement. This makes DT quite effective in balancing human desirability issues with technical feasibility and economic viability when developing new products, concepts or services.<sup>12</sup> DT is also future-oriented, as the concepts it helps to create over time

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<sup>11</sup> See e.g. Brown 2008, Dunne & Martin 2006, Lockwood 2010.

<sup>12</sup>See e.g. Johnson & Woodilla, 2009, 2010, Hassi & Laakso 2011.



become the products and services of the future.<sup>13</sup>

Design Thinking approaches have proliferated quickly in the past decade, and we can take this rapid diffusion as a signal of both success and utility. Innovation is in many cases surprising and unforeseeable. The concept of a rhizome<sup>14</sup> helps to illustrate environments in which DT approaches can be effective. In a rhizome, learning and the spread of ideas can be understood as analogous to widespread fungus roots underground, waiting for suitable conditions to grow the visible mushroom. By contrast, the static image of a tree, often employed to represent the growth of knowledge, cannot fully describe the dynamic configurations that emerge in innovation. Developments in social media, the arts, or the startup world can be named as just a few examples. Learning in such a continuously shifting environment requires immersion, learning by doing, learning by being and learning by living. A rhizome is everywhere, networked and ‘underground’, at times invisible and not readily understandable. We are only able to recreate the causalities afterwards, by joining the dots as we saw them in the past. Switching our conception of learning from the image of a tree to that of a rhizome has important implications for planning and leading innovation activities. It also leads us to acknowledge the complex inter-dependencies between stakeholders and thus to reevaluate the relational positions between them.

## **Towards best practice - case examples**

In this section we examine three case studies with different configurations of existing relational models and desired ones, capturing also the maturity of the abilities of the actors and the clarity of the roles in the ecosystem. We also attempt a running commentary on the shared value created by the initiatives. In the first case, Mobile Ecosystem, starting from an initial authority ranking (AR) model, the project aims to achieve communal sharing (CS), to bring together a wide range of actors to the same table in a collaborative fashion to promote entrepreneurship. In this case the actors have well developed abilities and roles are also mostly clear. In the second case, Developer Park, the starting situation is based on a market pricing (MP) model and the desire is to move internally into a more communal sharing (CS) model, aiming to capture the creative energy of a community of developers. In this case the abilities to operate in ecosystems are also well developed and the roles are partly clear. In the last case, WASH Ecosystem, the initial situation is based on an equality matching (EM) model, and the aim is to develop toward the communal sharing (CS) model. In this case the abilities of the participants are not fully developed and the roles are somewhat unclear.

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<sup>13</sup>On a higher level, concepts are the means by which we move beyond experience so as to be able to think in new ways. They must be creative, active, and exploratory, rather than just being descriptive, reductionist (simplifying), or representative (Deleuze & Guattari, 1987, 1994).

<sup>14</sup>The idea of rhizome, according to Deleuze and Guattari (1987), describes the concurrent connections of the most similar and farthest away ideas, objects, people, and places. These apparently random and non-hierarchical connections and collisions map the processes of affect in networked, relational, and transversal thought, without being fixed to a construction of a linear and rigid structure.

## **Mobile ecosystem**

In the case of building an innovation hub and a corresponding ecosystem in an east Mediterranean country, the very high level objectives were to promote the competitiveness of the whole society, while at the same time being concerned with lower level aims such as developing 21st century skills in schools. While this mobile communications oriented programme was driven initially top down in terms of the conceptualisation, it had aims to build on open innovation and crowdsourcing mechanisms, creating a balanced approach in the medium and long run.<sup>15</sup> In order to address the initial credibility and trust issues, an external institutional facilitator.<sup>16</sup> was engaged to bring the parties together to think of the future.

The project had a focus initially on the mobile internet ecosystem (mobile apps), and was to involve innovation stakeholders such as universities, industry clusters, start-ups, microenterprises, incubators, angel investors, venture capitalists, and government. In other words a challenging palette of actors to place into the same collaborative space at any given time. Many of the commercial actors operated in a default market pricing (MP) relational model, and the institutional participants and the knowledge producers mostly in an authority ranking (AR) one. The aim was to move towards an operational model resembling communal sharing (CS) over time. As the initiative was driven top down by institutional participants, the stakeholders tended to perceive it in AR terms. This role of integrating the actors and in some cases expanding their abilities also involved a significant translating activity, as the operational environment was not fully conducive to collaborative effort and/or activities. It was not a question of lack of awareness, but of practice in collaboration - the key actors had often been educated in collaboration friendly places,<sup>17</sup> but were unable to put in place new practices within existing settings. The initial mentoring activities included workshopping and co-creation, creating a series of joint outputs that laid out the first steps for future collaborative hubs aiming to empower local entrepreneurs and create a lab for prototyping and experimentation.

In many ways, the relational aspects between the overall set of stakeholders were initially set in terms of the AR model, with the participating entrepreneurs subscribing to the market pricing model. It is foreseeable that moving toward a collaborative model of communal sharing will require both time and continuity in significant effort from the key public sector integrators. While the initial project managed to unlock the relational set-up between some of the actors, temporarily reconfiguring their thinking for the duration of the intervention, there is no firm evidence of a longer term reconfiguration. Thus also the longer term shared value creation remains unclear. Perhaps the key difficulty lies in the sheer number of collaborators - learning and practicing collaborative work is complex and from individual viewpoints the perceived value creation might be slow and insufficient. Design Thinking approaches, tools and methods were used throughout the early phase to discover, define, develop and deliver the initial outcomes.

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<sup>15</sup>The key challenges were linked to the low level of collaboration between public sector actors and entrepreneurs, with users and university actors mostly sidelined.

<sup>16</sup>An international development bank.

<sup>17</sup>Such as the Silicon Valley.

## **Developer Park**

The science park in the North African country had been operating for a number of years, with a focus on providing high quality venues for global players engaged in call centre and remote ICT support business. While public funding had been used to develop the initial phases of the park, the operational model resembled real estate business to a great degree, as the park did not have an active engagement or equity holding role in the businesses of the tenants. When developing the strategy for the expansion of the park, the national authorities saw an opportunity to support the co-location of local ICT agglomerations, aiming to retain and develop further the local knowledge base and skills. This meant developing strategies and facilities to engage communities of local developers, early stage enterprises and SMEs, co-located with some larger anchor firms. In order to co-design the approach and strategy for the expansion of the park, an external facilitator was engaged,<sup>18</sup> and through a multi-party co-creation workshopping approach with stakeholders from government, private ICT actors, universities, and communities of local entrepreneurs and innovators were brought together.

The aim of the cross-functional working party was to examine the innovation ecosystem of the park and to develop a proposal for an innovation hub that would both complement the existing park facilities and create new types of interaction and collaboration across the co-located actors. The development work involved examining the services, infrastructure and business models, with consideration given to the support services and curated activities, the nature of the collaborative spaces, and community building with developers, entrepreneurs and local innovators. This essentially implied moving from an initial full market pricing (MP) relational model into a more collaborative one based on a mix of communal sharing (CS) for the smaller operators and MP for larger operators.<sup>19</sup> The key role of the leadership of the park, together with the external facilitator team, was to integrate the view and desires of the top down and bottom up actors. This was not entirely straightforward, as it involved working with the park operators and current tenants (the main actors) who operated on a MP model, and some university and research oriented players with an EM view of the situation, and with developers and innovators adhering to a CS model. The facilitator team found themselves engaged in a translating function between the top-down and bottom-up views, and in some cases bringing some of the participants up to speed through an expanding role. In many ways, the external facilitators engaged in multiple ways in mentoring activities including workshops and helping to co-create the next steps towards the future innovation hub.

The initiative focused on the front end of the development process, and thus only the initial steps have been made in the shift toward more collaborative ways of working and thinking. The participants were very aware of the benefits of shared value and collaboration, but also recognized the deep roots of a competitive MP mindset. This mindset was not seen to be entirely based on financial resources, as much of the transaction was seen to be based on exchanges of power and in-kind exchanges of favours. The participants were very well trained experts in their own fields, with highly developed

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<sup>18</sup> An international development bank.

<sup>19</sup>That being said, the larger operators were seen to benefit directly from the co-location and the CS mode in their dealings with the smaller participants.

individual and social abilities. That being said, the scarcity of resources over time has led to a serious partial optimization issue, where the larger whole does not get priority over one's own immediate mandate. Design Thinking was the key method used in the mentoring activities. Through a process of identifying the ecosystems elements, defining value opportunities, developing initial business models and testing the initial solutions, the participants co-created the series of potential solutions for further development.

## **WASH Ecosystem**

The WASH Ecosystem case describes a challenging co-creation process encompassing various organisations partnering to support WASH innovations in East Africa. The partners in the project ranged from intergovernmental organisations to universities and both local and foreign enterprises. The aim of the project was to generate needs-based solutions to water and sanitation challenges faced by children in rural East Africa. The initiative was built around multi-disciplinary innovation courses, in which university students approached the WASH challenges with the help of development practitioners and private sector specialists, in close collaboration with the school children themselves. The approach combined human-centered design with human rights based methodology, in an effort to bring a fresh collaborative perspective to persistent development challenges, and to ensure the solutions would first and foremost address the needs and interests of school children.

The initiative was a first of its kind for the partners involved, and the collaborative abilities of many of the stakeholders (including young students) were only being developed at the time of implementation. Premised on the idea that each partner had an important piece of the puzzle to contribute, the project laid out a collaborative framework that connected the work of the participating organisations on an equal level (EM). The partners depended on each other to complement their work and to generate a more thorough picture of the innovation context. While in principle the complementarities were evident and the partners were motivated to collaborate, they immediately faced numerous coordination obstacles: physical distances, conflicting schedules and logistical challenges. Another level of difficulty related to significant differences in organisational cultures. While the initiative had been launched under a conceptual scheme approved by all, the collaborative principles of the project were interpreted differently by representatives of separate organisations. Under the guise of imprecise terms such as 'co-creation', several operational strategies were eventually undertaken by the various partners.

As the project included a strong focus on learning, it comprised significant levels of mentoring activities and training aiming at expanding the capabilities of all participants. The project was conceived according to DT practices, also emphasising a normative human rights perspective and the equality of all stakeholders. The activities were aiming for human-centered innovations, which meant employing DT tools and attempting to translate between multiple areas of knowledge. The project was set up in an integrative framework, openly seeking to build shared value and to promote a CS configuration between the partners. This was however very challenging in practice, as the heavy coordination load pushed the interaction closer to a mix of an AR model (in the coordination of activities) and an EM configuration (between the equal, but often disconnected partners). The

project involved multiple layers of collaboration and parallel activities, and while the roles of partners had been defined, the principles of interaction between the stakeholders were difficult to grasp for many participants. Where some saw the activities in terms of a CS model, others referred to EM and AR models. As predicted by relational model theory, the confusion brought about by the clash between relational expectations undermined many of the activities, leading to misinterpretations, conflicts and at times disengagement of individual stakeholders.<sup>20</sup> The project was noteworthy as one which didn't engage along an MP model with any of the partners. This allowed for shared value creation to be accepted as the overarching aim by all participants, and to lay the basis for in-depth collaboration and high levels of dependency and buy-in between partners. On the other hand it exemplified the need to mediate clearly between EM, AR and CS, in order to create a harmonious environment for such joint value collaboration to reach its potential.

## Conclusions

In this exploratory paper we initially recognized the difference between the desired new ways of collaboration, networking and sharing and the reality on the ground of the prevalence of sub-optimal organisational arrangements, ways of working and failures to engage with other players. We noted that this dichotomy has not gone unnoticed, and that an important aspect of the challenge can be seen as arising from underlying conflicting relational positions between stakeholders. We built upon findings from relational theory, where the case has been made that contributions to joint value can be increased when transitioning from a market pricing (MP) relational model toward the communal sharing (CS) one. Based on the work of Bridoux and Stoelhorst, we argued that CS, AR and EM models of interaction are more effective when seeking to contribute to public goods and create joint value. This was highlighted as relevant also in the context of innovation ecosystems, understood as networks of interconnected organizations that create and appropriate value through innovation involving both production and participants from the user side.

Through short illustrative case examples, we examined recent international initiatives in which such a reorganisation of stakeholder positions and collaborative practices has been attempted. We observe that individual capabilities and social competence are needed at a minimal level. The integrating, translating and expanding roles of the actors can be identified in all case examples, and play a significant role in the transition of MP models to CS ones and in avoiding disruptions and conflicts caused by unstable relational frames. As a general observation, the case studies also demonstrated clearly the need to consider the length of time that any intervention would take, as short interventions may not create lasting changes.

In Figure 2 we have sketched out the relationships between relational models, joint value creation and mentored transitions. The highest possible value added area is

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<sup>20</sup>This challenge reflects the findings of Bridoux and Stoelhorst (2014), suggesting that inconsistencies in organisations' relational treatment of stakeholders are more detrimental to value creation than the stable application of any chosen relational approach.

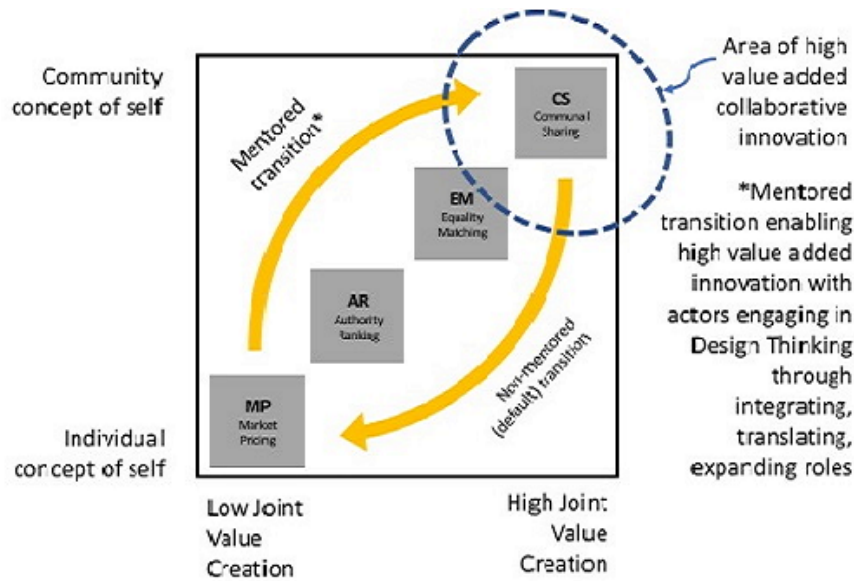


Figure 2. Mentored Transitions

important in terms of innovation, as it is noted that, while AR and EM models are collaborative, they do not have the same high value additions potential as CS.

It is also noted that transitions also happen from collaborative models back to market pricing one, and thus the potential for high value added innovation is potentially lost. This implies that maintaining the potential of the CS model requires active collaboration it itself.

In terms of future research, there is ample space to investigate further the models themselves, their prevalence, specific nature and dynamic interplay. The transition phases, the key influencing factors and their interplay, together with the reverse potential of falling out of collaborative models are clearly also open for further examination.

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# Exploring the use of Web 2.0 Tools in Teaching English in Secondary Schools

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## Abstract

With the demand of globalization, creative and innovative ways of accessing learning information should be embraced in secondary schools. Web 2.0 technologies demonstrate interest in learning. This study explored the use of weblogs and podcasts in teaching English language. 36 teachers of English in Kisumu West Sub County participated in the survey. Findings from the study revealed that Web 2.0 tools could enhance the teaching of English though many schools lacked resources. However, Web 2.0 tools could be accessed on smart phones. The study concluded that Web 2.0 tools should be embedded in the curriculum as learners become active in a collaborative and interactive learning environment. The study recommended that schools should be equipped with computers or use mobile learning to enable integration of Web 2.0 tools. The Ministry of Education Science and Technology should facilitate internet connection to schools or provide technological resource centres for access to such technologies.

**Relevance to innovation.** Use of Web 2.0 tools creates a social, interactive and collaborative learning environment where learners scaffold one another when they create and share materials at the same time giving comments. A learner centred environment is enabled as learners ensure effectiveness in the work shared knowing it is meant for a wider audience. Besides, learning is not restricted to the confines of the classroom but rather information can be accessed once one has an internet enabled phone. The teacher on the other hand can use m-learning by projecting learning materials on an interactive board..

**Keywords.** Collaboration, English Language, Podcasts, Web 2.0 tools, Weblogs.

## Introduction

With the increase in technology, learning through the internet has introduced innovative ways of teaching such as Web 2.0 tools. Web 2.0 tools are internet tools that allow users interact and create content. According to Hartshorne and Ajjan (2009), Web 2.0 technologies support active and social learning since feedback is meaningful when learners

share information, thus providing a scaffold creating a Zone of Proximal Development. Richardson (2009) argues that Web 2.0 has the potential to create interactive learning environments in which learners become knowledge creators, producers, editors, and evaluators. Students become responsible for learning as they produce and consume educational information making them active. According to (Cochrane, 2010) using Web 2.0 tools has made teaching methods shift from instructive pedagogical paradigm to a social constructivist pedagogical paradigm, where students are active participants.

Integrating Web 2.0 in classrooms promotes meaningful learning and failure of utilization of Web 2.0 services in classrooms, jeopardizes the culture of discourse for young people in the way in which they interact socially. In addition, Web 2.0 tools enable curriculum designers to design a curriculum that is more learner centred and interactive (Bower, et al., 2010). Moreover, the teacher of today can choose to integrate technology in the curriculum while ensuring that appropriate technologies are selected and how the student would utilize them. The use of Web 2.0 tools such as podcast and weblogs in the curriculum bring about collaboration and increased learning content since the students create topics and access educational materials shared and communicated by others. Being a social network, users create a forum for discussion and brainstorming making students to think critically (Dede, 2005). Therefore, making use of such technologies creates an interactive virtual classroom where learners work in collaboration creating materials while at the same time gaining relevant information.

Web 2.0 technologies are open in nature and easy to use. Besides, using Web 2.0 technologies does not restrict learning in a classroom set up. The learner today who is immersed in the digital media can access relevant information as long as an internet enabled phone is available. In support Ogunsaju (2009) argues that teachers should enliven lessons by keeping abreast of current updates in subject of specialization. Being aware of technologies, enable teachers become creative on ways of teaching and transforming education practices into constructive learning. As Jones and Cuthrell, (2011) reported; Web 2.0 tools are being incorporated into the academic arena from preschool to university to enhance learning in an innovative manner. Moreover, the elementary school age child today obtains information via various interactive sources including social networking sites, where they are able to witness events as they happen, rather than simply reading a traditional hardcopy newspaper (Jones & Cuthrell). It is therefore necessary that the student in secondary school utilizes Web 2.0 tools to enhance the learning of English; as integrating of web 2.0 tools in education will lead to a shift from teacher centered delivery of information to an interactive learner centered teaching.

The purpose of this study was to explore the integration of Weblogs and Podcasts in the teaching of English language in secondary schools.

## **Literature review**

### **Use of information communication technology in teaching**

The Internet provides learning opportunities for students to connect with educational materials available on the web. Information Communication Technologies (ICT) are defined as a diverse set of technological tools and resources used to communicate, and to

create, disseminate, store, and manage information. Such tools include communication devices or application such as; projector, radio, television, cellular phones, computer, internet network, hardware and software, satellite systems and various services associated with them for example video conferencing and distance learning. These tools can be used to facilitate learning by both the teacher and the students. Technological tools provide additional motivation (Thompson, 2007) as the students can access social networks for interaction with other peers.

The demand for incorporating innovative and creative ways of learning has diversified teaching and learning of English from conventional methods to innovative ways such as Computer assisted language learning (CALL). CALL focuses in computer utilization to enhance language learning (Hartoyo, 2010). As a result teachers cease being the source of knowledge in the classroom as learners work in collaboration with other learning groups. Using CALL improves efficiency and effectiveness of learning by understanding and mastery of the language studied. CALL is able to generate interaction and improve communicative competence, including providing authentic material to the class or individual learning. Egbert, Akasha, Huff and Lee (2011: 12) asserted that “Computers, mobile devices and all forms of new technology can be used for language learning, but the essential component to make them effective is a creative, innovative, and forward-looking teacher who can match the needs of students with the capabilities of evolving technology to result in learning.”

Bingimlas (2009) observed that teachers had a strong desire for the integration of ICT into education but lack of access to resources was a barrier. In support, Adetimirin (2011) posits that using such resources depends highly on availability and accessibility. Mingaine (2013) reported that implementation of ICT in schools in developing countries remains very limited despite a decade of considerable large investments in the technology. Kenya too has been affected in implementation of ICT in schools as she struggles with poverty. However, there is need for provision of affordable infrastructure to facilitate access to technological tools, based on guiding principles of the national ICT policy for Kenya (2006). In Kenya education system electronic-learning (e- learning) has been incorporated in higher institutions of learning. On the other hand, some primary schools have access to technological tools with the provision of tablets by the government. However, the government’s efforts towards improving access to ICT by providing one mobile digital laboratory for use by secondary schools per constituency has not been realized.

### **Weblogs and English language teaching**

A weblog, or blog, is an authentic innovation of the Internet providing students with a learner centred environment. Blogs refers to a simple webpage consisting of brief paragraphs of opinion, information, personal diary entries, or links, called posts, arranged chronologically with the most recent first, in the style of an online journal, and finally social networks. According to Pinkman (2005), blogging allows users with little or no computer background to create design and maintain blogs. Educational blogs in schools setups are utilized as creative tools that offer teachers immeasurable chances to develop pedagogical practices. In addition, blogs support reflective learning as learners can revisit experiences shared and use schema to learn new experiences. Stanley (2006) notes that

blogs open up classroom walls by showing the wider world what is happening, thus creating a small language learning community. There are three types of blogs according to Campbell (2003) that can be used in English language learning classrooms.

First, the tutor blog in which the teacher posts handouts and a syllabus or provides a website for the students ensuring daily reading practice for students. Students are allowed to make comments on the tutors or other learner's blogs. Blogs provide the necessary opportunity for shared process as they serve as a platform to start discussions, initiate reading interactively and facilitate reading activities. On the other hand, blogs besides improving writing, reading skills and vocabulary, they contribute to learning motivation and opportunities for authorship and readership. Blogs have been associated with reading and exploited for this skill to the extent that some texts books have passages from online blogs as an authentic source (Anderson, 2010).

Secondly, is the learner blog which serves for the improvement of reading and writing skills of the students when students update their blogs when expressing personal experiences and interests. Stanley (2006) suggests that students have a better understanding about the value of their writing as a real audience and a real purpose to write is established. Besides, they improve reading and writing skills by reading and making comments on peer's posts. In addition, writing may not be necessarily restricted to a topic. Strampel (2007) reported that learners perceived blogs offered them the ability to evaluate their own learning and to reflect on their thinking. Furthermore, critical thinking is paramount for they are aware that what is created is for a wider audience. On the other hand, Blogs offer many new chances for students to practice and improve their writing skills and make this process more manageable for both teachers and students (Arslan, 2014)

The third category which is the class blog involves collaborative work between the teacher and student thus creating a sense of a class community. This blog serves as an extra work after classroom interaction, motivating students to do further research and to write more in depth about the topics mentioned in class. When students publish their ideas and communicate with other learners online; a collaborative learning environment is created where language learners are invited to give feedback on each others' posts or complete tasks together. Webb (2009) found that an online language exchange program conducted through blogging between students in the UK and Spain helped the students to develop Spanish and English skills, respectively thus fostering second language development.

On the other hand, Zwalinski (2009) categorizes blogs according to content and presents four common types of blogs: classroom news blogs, mirror blogs, showcase blogs and literature response blogs. The literature response blogs motivates students to write about a text covered in class and reflects on it deeply as an assignment. Faramarzi (2013) observed that student's vocabulary and use of grammatical structures were more correct. It was observed that the students recommended a lot of different vocabulary to each other from the feedback from peers.

## **Podcasts and English language teaching**

Podcast is learning by listening to audio or video files disseminated on the internet. Using foreign languages video clips that combine text, image, and music as learning materials stimulate students' emotional and cognitive areas in the process of learning. Moreover, Cross (2014) asserts that podcasts improves language beyond constraints of classrooms as up to-date, wide and extensive source of audio and video can be accessed by students. Furthermore, learning with video clips creates interest to the target language because student expresses emotions, imagination, experiences and knowledge. Therefore, meaningful learning tasks for listening and speaking skills can be viewed from a podcast from a native speaker. On the other hand, Fernandez, Simo and Sallan (2009) revealed that podcasting was not a substitute for traditional learning system; however, it increased learners' motivation. In support, Kim and King (2011) reported that implementation of podcasting into the classroom was interesting and influential.

Podcasting enhances language teaching as it supports digital recordings to be easily posted to the Internet for downloading to a personal audio player or electronic portable devices such as MP3, or mobile phones, and then can be watched or listened to at any time or any place (Evans, 2008). Educational podcasting distributed by instructors on course website allow learners to review, listen to, and download them to their own personal digital devices. Such podcast lessons/ lectures provide flexibility since students can access and review the course lectures at their convenience, which in turn empowers them to practice the self-learning process (Beheler, 2007). Learners with access to technology can autonomously employ and exploit podcasts to build on their classroom learning whether at home, or on the move, which in turn helps them increase their exposure to the target language and culture, and improve their language skills. On the other hand, teachers can prepare materials for learning and avail them on podcast for students to use wherever they are (Lord, 2008). According to Huntsberger and Stavitsky (2007), podcasts can be used to supplement learning resources such as textbooks by helping students pay attention to their instructional material on the podcast content (Hawke, 2010). Moreover, Lee (2009) reported that teachers can go beyond the confines of course content as a wide range of authentic podcasts are available to cater for different learners ability and interests.

According to Ducate and Lomicka (2009),t podcasting could be implemented as a tool for enhancing learners' pronunciation. This is because podcasts offer rich input through authentic speech. On the other hand effective listening enhances learners of English as a second language to improve their understanding and learning materials. Since podcasts can be downloaded, students can review lecture notes for better understanding. This gives a provision to assist students with different abilities. Knight (2010) observed that podcasts were efficient for developing phonetics accuracy for phonetics exercises. Similarly, Lebron-Lozada (2012), observed that students improved in conversational abilities by producing fewer mistakes and better pronunciation and more fluent speech, when they produced their own podcast. Therefore teachers should integrate podcasting into teaching for learners to get embedded in the culture of the language. Moreover, podcasts provide students the opportunity to experience authentic forms of the language and get personal involvement to learn various skills of English language.

## **Theoretical framework**

The study was guided by Social Cognitive Theory by Albert Bandura (1986). Constructivism contends that acquisition of knowledge occurs through active interaction between the individual and environment. Using Web technologies creates a social and interactive learning environment in which learners become producers of their own knowledge when they create and actively participate by reading other learning materials shared on educational platforms.

## **Methodology**

The study adopted a descriptive survey as the focus was on gaining awareness and views of teachers in integrating Web technologies in teaching and learning of English in secondary schools. Purposive sampling was used to select 36 teachers of English in Kisumu west Sub County. Data was collected using self administered questionnaires. The first section gathered general information of the teachers, while section two solicited information on ICT resources and also it consisted of a 4 -scale Likert items ranging from strongly agree, agree, disagree and strongly disagree. The questions gathered views of the teacher's awareness and integration of Web technologies. The last section had open ended questions on how Web technologies could be implemented. A follow up semi-structured interview was conducted on 5 teachers for in-depth understanding on the usage of Web technologies in secondary schools. Quantitative data was analyzed and presented by frequencies and percentages in tables. Qualitative data from the interview was transcribed and coded using themes from research questions and reported verbatim.. Ethical measures undertaken included informed consent, clarification on the purpose and benefits of the study.

## **Discussion**

Data collected was analyzed using descriptive statistics. This was done in line with the research questions. Findings are presented in tables and quotes from the interviewed respondents.

### **Respondent's Bio data**

The study engaged 36 teachers of which 21(58.3%) were female and 15(41.7%) male as illustrated in Table 1. All the teachers who participated in the study had been trained as professional teachers.

Table 2 presents the distribution of respondents by teaching experience. The results revealed that 3 teachers (8.3%) had experience of 1-5 years, 9 teachers (25%) had experience of 6- 10 years, 10 teachers(27.7%) had teaching experience of 11-15 years and those with experience of 16 years and above were 14(39%).

**Table 1. Distribution of respondents by gender**

<b>Gender</b>	<b>n</b>	<b>%</b>
Female	21	58.3
Male	9	41.7
Total	36	100

**Table 2. Distribution of respondents by experience in teaching**

<b>Teaching Exp. (years)</b>	<b>n</b>	<b>%</b>
1-5	3	8.3
6-10	9	25.0
11-15	10	27.7
16 and above	14	39
Total	36	100

**Table 3. Familiarity with Web 2.0 tools**

<b>Web tool</b>	<b>Yes</b>	<b>No</b>	<b>Somehow</b>	<b>Total</b>
Blog	36.20%	13.85	50.05	100%
Podcasts/Video cast	64	8.3	27.7	100%

### **Awareness and integration of web technologies**

The results revealed that 8(22.2%) schools had computers leaving out 28 (77.8%). This result is in line with literature that revealed that teachers were eager to integrate ICT but they lacked the resources. Furthermore only 4(11.1%) schools offered computer studies; however, this was not likely to be a challenge to accessing social networks since they were user friendly and can be accessed as long as one has an internet enabled phone, laptop or computer. The statistics in Table 3 reveal that majority of the teachers were aware of social networks, however, they did not use them in the classroom for the purpose of teaching.

The results in Table 4 reveal that 83% of the respondents agreed that social networks are useful in teaching while 69% agreed that social networks could improve in planning of lessons. Some used them for gathering information for teaching but did not refer the learners to those sites. One of the respondents said this on accessing Web 2.0 technologies:

*I access social networks almost every day, and there is so much information I get. At one time i downloaded slides which I used for teaching etiquette in class.*

While another respondent on the use of mobile phone for M-Learning said:

*It would be much easier if we had intranet connected in the school as these could be faster. At times the data bundles just get finished because of poor network.*



**Table 4. Respondents level on integration of Web 2.0 technologies**

<b>Statement</b>	<b>Strongly Disagree</b>	<b>Disagree</b>	<b>Agree</b>	<b>Strongly agree</b>	<b>Total</b>
Social networks are useful in teaching	5.50%	11.50%	47.60%	36.10%	100%
Social networks can enable me plan my lessons	8.30%	22.20%	58.30%	11.10%	100%
Social networks arouses students interest in learning	2.70%	13.80%	50.00%	33.30%	100%
Social networks enable collaboration in learning	13.85%	22.20%	47.60%	22.20%	100%
Social networks can improve reading skills	5.50%	5.50%	66.60%	22.20%	100%
Social networks can improve writing skills	27.70%	36.10%	22.20%	11.10%	100%
Social networks can improve listening skills	11.10%	22.20%	52.70%	13.80%	100%
Social networks can develop vocabulary	5.50%	13.80%	44.70%	36.15%	100%
Social networks can Improve my teaching competence	8.30%	13.80%	47.20%	30.50%	100%
I can adopt using social networks in class	11.10%	22.20%	47.60%	25.00%	100%
Social network can be accessed anywhere	25.50%	47.60%	25.50%	8.30%	100%

Moreover 77% revealed that social networks would make them be competent in teaching. In addition, 72% were willing to integrate technological tools in the classroom. On the other hand, the results support reviewed literature which states that integration of Web 2.0 technologies developed language skills. However, 63.3% of the respondents felt that writing skills can not be improved by social networks. A respondent had strong remarks on writing skills:

*Social networks has messed up writing skills especially spelling as people just write the way they feel without checking the spelling. Maybe if they know it will be examined, they will be more careful.*

While majority of the respondents (83%) felt that social networks would arouse interest in the students only 3% felt that it was possible to access them anywhere. This reveals that Kenya still needs to ensure that internet is available across the country. The respondents felt that integration of Web 2.0 technologies was most likely going to improve performance in English as most of the students would be enthusiastic in learning in a “digitalized” environment. One of the respondents reported:

*It is a dotcom world, our children are moving first with technology and if we embrace it in the system... I feel that is a motivation.*

The results revealed that a gap had been created by the introduction of tablets in primary schools yet when the students transit to tertiary education, they are expected to access information on Web technologies. It was observed that it was necessary for secondary schools to integrate using web technologies for smooth transition as one responded asserted:

*Our students are not allowed to have mobile phones in schools but we know they have them at home. Having them discussing on the platforms especially set books will give varied opinion from peers. I believe it sounds easier for them to discuss on social media rather than facing the teacher in the classroom.*

Lastly, the study revealed that in the event that schools do not have computers, the teacher can use his/her mobile phone especially when it comes to teaching listening skills as an expert who is a native speaker would give the correct pronunciation of words. M-Learning can also be projected on an interactive board for all the learners to view and discuss. The study also revealed that teachers could organize class sessions with schools that had resources and a technological resource centre to be constructed to serve several schools in a region just in the same way as the national libraries operate.

## Conclusion

The findings from the study revealed that Web technologies when integrated in the curriculum would enhance teaching of English language. The study therefore concluded that Web 2.0 tools should be integrated in the curriculum as it aroused the interest of the learners besides making them active and collaborative in a social interactive learning environment. This will ensure that the learning is shifted from being teacher centred to learner centred. On the other hand learners become familiar with technologies which they are expected to use when they exit to tertiary institutions for further research. The study recommends that teachers to use mobile smart phones in cases where other resources like laptops and desktops are not available. The study also recommended that the government should make an effort of providing internet in all regions of the country and set up technological resource centres for accessing technological tools.

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# Peer Group Programme for Children and Adolescents with HIV in Nairobi: Common Therapeutic Elements Approach

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## Abstract

Our paper begins by reviewing the mental health burden of adolescents living with HIV in Africa and Kenya. Secondly, we discuss HIV related mental health problems common in Kenya and prevalence of HIV related morbidity and mortality in this vulnerable group. We then map out the nature of HIV services in hospital settings and underscore the paucity of culturally rooted, relevant evidence based psychosocial interventions that encourage health seeking behaviors. With this background, we draw out our team's emphasis on utilizing a common elements therapeutic approach in drawing out a peer group psychosocial intervention offered at the Comprehensive Care Centre of Kenyatta National Hospital. We share our conceptual framework developed iteratively by multiple partnership discussions and then delineate specific 'common elements' from different approaches and treatments for HIV positive adolescents. We share a novel health systems implementation approach of developing interventions that are curative and preventative through multidisciplinary partnership models. **Relevance to innovation.** We share an innovative common elements therapeutic approach that is evidence based and a popular option in mental health care in developed countries. We intend to adapt the novel model in the Kenyan context, to achieve positive outcomes in clinical and mental health indicators. Its advantage is that it is usable by health care workers and peer supporters with diverse levels of training and experience in mental health. It can also be contextualized to suit health care in low and middle income contexts without losing its impact potential. When trained in its use, health care workers can be able to scale it to diverse populations in other health care settings in Kenya and beyond.

**Keywords.** Children and adolescents with HIV, common elements therapeutic approach, mental health intervention, self growth, stigma prevention.

## **Introduction- prevalence of HIV related morbidity and mortality in children and adolescents**

The Human Immunodeficiency Virus (HIV) and Acquired Immunodeficiency Syndrome (AIDS) have a severe impact on the lives of children and adolescents throughout the world. SubSaharan Africa (SSA) has the world's highest prevalence of HIV incidence. UNAIDS (2011) estimated that 55 million young people aged 15-24 years were living with HIV/AIDS around the world and out of these, 3.8 million were in SSA. Kenya is among six countries in the world with the highest number of adolescents infected with HIV/AIDS. According to NACC (2015), 435,225 adolescents aged between 10 and 19 years in Kenya are HIV positive, with Nairobi County is leading with 49,904 adolescents living with HIV, while another 119,899 have the virus 'but are not yet identified'. New infections are highest among older adolescent and young adults. The annual new infections among children aged 0-14 years, is 12,511 and 13,148 for those aged 14-25 years. For 20% of youth aged 15-24 years, new infections are attributed to early sexual debuts before their 15th birthday. Data from the 2012 Kenya AIDS Indicator Survey shows a dramatic difference in HIV prevalence for adolescents aged 15-19 years at 2.0% and 5.9% for those aged 20-24 years (NASCO, 2014). This difference suggests that many young people are infected during adolescence. Female youth are significantly more likely to be infected than their male peers. For instance, among 15-19 years olds, 31.1% were females and 0.9% were males, while among 20-24 year olds, 4.6 % were females and 1.3% were males.

At present, Kenya has made marked progress in the prevention and management of HIV infection since the first diagnosis was made 3 decades ago. The increased access to antiretroviral treatment has resulted in increased survival rates among the children and adolescents infected with HIV/AIDS. However, HIV still remains a challenge in the general population with over 100,000 new infections annually (NASCO, 2016). Adolescents and young people still bear the brunt of HIV epidemic due to limited access to information, services, stigma and discrimination (NACC, 2015). While Care and treatment programs for people living with HIV can be found in every country, there is a gap in provision of ongoing HIV/AIDS treatment, care and support programs that are specialized in addressing the needs of adolescents.

## **Mental Health in child and adolescent HIV**

### **Mental health challenges that exacerbate the HIV disease**

The HIV/AIDS pandemic has severely impacted the mental health of children and youth. A few studies suggest that HIV infected children and youth may be at a greater risk for psychiatric problems or poor mental health problems compared with their uninfected peers (Bhana, et al. 2014, Mellins et al., 2009). Mental health functioning is among the most significant predictors of health and behavioral outcomes. Thus mental health problems may be a predisposing factor for HIV infection or a perpetuating factor for risky behavior in HIV infected youth. According to Vranda and Mothi (2013) children with chronic illness are at risk of psychiatric problems including depression, anxiety and feeling of isolation. This is due to complexity of their illness and treatment as well as

the adverse psychological circumstances and life in distressed areas affected by poverty, violence, family conflict, substance use and limited access to care.

A study done by Kamau et al. (2012) in Kenya, found the prevalence of psychiatric disorders to be 48.8% among children and adolescents attending the Comprehensive Care Centre (CCC) of Kenyatta National Hospital (KNH), aged between 6-18 years from low-resources settings. The most common disorders found were major depression, social phobia, oppositional defiant disorder, attention deficit hyperactivity disorder, specific phobia, bipolar disorder, panic disorder, conduct disorder, agoraphobia, separation anxiety disorder, dysthymia, psychotic disorder, post traumatic stress disorder, and pervasive developmental disorder. A quarter of the participants were found to have more than one psychiatric disorder. A Ugandan study focusing on adolescents who were HIV positive found high rates of anxiety, depression, somatization and mania (Musisi & Kinyanda, 2009).

Kim and colleagues (2015) examined factors that were associated with depression among HIV infected adolescents in Malawi. They looked at different factors such as socio-demographics, post traumatic stressors, behavioral factors, social support and bio-clinical parameters. The examined a sample of 562 HIV positive adolescents with a mean age reported as 14.5 years and 56.1% were female. They found that the prevalence of depression was 18.9%. Factors that were strongly associated with depression include, female gender, fewer years of schooling, death in the family / household, failing a school term / class, having a boyfriend or girlfriend, not disclosed to or not sharing one's HIV status with another person, severe immune-suppression and bullying in school for taking medication. Findings from this study emphasize the need to have interventions that support mental health of HIV infected adolescents and stigma reduction to improve treatment outcomes.

Other studies have also shown that HIV positive children had higher rates of mental health problems than those who were not affected. One study from South Africa by Louw et al (2016) examined the emotional and behavioral problems in children with perinatally acquired HIV infection. The study aimed at providing a quantitative description of emotional and behavioural difficulties among 78 HIV infected youth and compared with a demographically matched 30 non HIV infected youths as a control. The study revealed significant depression rates in caregivers whose children were HIV infected. Kapetanovic et al (2012) similarly looked at the mental health burden of both pediatric HIV positive and pediatric HIV exposed uninfected adolescents and established that the factors associated with increased mental health problems among the adolescents include caregiver's characteristics such as psychiatric disorder and health related functional limitations.

Mental health problems have been found to have a negative impact on HIV positive adolescents. Issues of poor adherence to treatment, increased risk behaviors were results of increased mental health problems such as depression, emotional and behavioral difficulties (Dow, et al. 2016; Kim, et al.2015). Adolescents who are depressed, tend not to take their medication when they are depressed leading to high viral load (Chandawani et al, 2012). Williams et al. (2010) found that HIV positive and HIV negative adolescents aged 12-18 years in western Kenya were at a significantly increased risk of substance use and having psychiatric symptoms. The odds of substance use were significantly increased when the



adolescents were found to have disruptive disorders and mood disorders. HIV positive adolescents who do not adhere to treatment, were found to have high viral load with significant association between non-adherence and substance use, as well as, internalizing behavior problems (Chandwani et al., 2012).

### **Evidence based Interventions to address challenges of children and adolescents living with HIV**

There exists evidenced based interventions that are used to tackle challenges faced by adolescents living with HIV/AIDS. According Bhana et al., (2014) there are few evidence based mental health and health promotion programs to support families in promoting the health and psychosocial well-being of children and adolescents living with HIV. Despite availability of antiretroviral treatment (ART), adolescents still experience a set of complex issues related to identification, care and treatment (Bhana et al., 2016). Adolescents are an ever growing part of HIV pandemic. There is a gap in psycho-social support, life skills education and peer support group interventions for the fast-growing HIV-positive adolescent population in Sub-Saharan Africa generally and Kenya specifically. Therefore, there is need for services for HIV positive adolescents that are age appropriate because adolescents have specific needs that cannot be met through child or adult clinics. Without creating a separate space for youth-friendly services, this already vulnerable population can get lost in current cascade of care into which they do not fit. Creating developmentally appropriate services for HIV positive adolescents will help open vital communication between them and healthcare personnel, which may help them stay engaged in care and thus facilitate health promoting behaviors. Contrastingly, age- appropriate transitional services for adolescents have been associated with improved follow up, better disease outcomes, and improved psychological health.

#### **Teen Club International**

The Bipai International Pediatric AIDS Initiative (BIPAI) was founded by American Physician Dr Mark Kline in 1999 to improve health and lives of children infected with HIV, through specialized high quality, high impact, highly ethical pediatric and family HIV/AIDS care and treatment programs ([www.bipai.org/Teen Club International](http://www.bipai.org/Teen Club International)). The structure is activity based and incorporates activities such as socio-recreation (games, drama, safaris, movies, music), psychoeducation (on topics such as HIV education, life skills, college and high school preparation, financial literacy), psychotherapy (to normalize teens social experiences and improve their outlook in life). The program is held monthly and facilitated by a multidisciplinary team of pediatricians, nurses, nutritionists, social workers, adolescent support officers, psychologists, and administrative staff. The target population is adolescents aged 10-19 years, In partnership with local governments, BIPAI has built and operates clinical centers of excellence and programs in different countries worldwide such as Botswana, Uganda, Lesotho, Swaziland, Malawi and Romania. As the Teen Club International programs provide a safe, welcoming and nurturing environment, positive outcomes result such as: increased attendance to the programs, positive relationships, increased self-esteem, reinforced positive habits

that ensure a healthy transition into adulthood. As recognized by the 2010 UNAIDS report ‘Children and AIDS’, Teen Clubs have become a global model of excellence for the provision of care and support to HIV-positive adolescents. They have shown to be an extremely effective group intervention.

### **Leading the Way Support Group in Canada**

The ‘Leading the Way’ support group program delivered by the Teresa Group in Canada, provides practical assistance and emotional support to children, youth and families living with and affected by HIV/AIDS (Shindler and Tangelder, 2010). According to Shindler et al. (2010), the program is a 9-week psychosocial support intervention offered twice a year by trained social workers. The program structure is activity based, and constitutes 4 distinct and complementary methodologies that guide its activities. These include: Socio-recreation, which encourages free and creative expression of feelings, thoughts and experiences through games, drama, music, and dancing; Psychotherapy, which is used to explore difficult issues and feelings associated with issues such as stigma, disclosure, mental health problems, loss, peer relations, and low self-esteem; Peer Modeling, which enables group members to learn from one another and which elicit social support; Psycho-education, which addresses information gaps around treatment and prosocial, positive models of how life can be led meaningfully. Findings from a study conducted in 2007 to identify the outcomes of the Leading the Way program indicated that disclosed children (aware of the presence of HIV in themselves and in their family) experienced less depression and anxiety compared to their non-disclosed counterparts. In addition, the intervention positively influenced the children’s sense of self and their ability to cope and problem solve.

### **UKA and CHAMP Support Groups in South Africa**

There are two evidence based programs in South Africa namely, the VUKA (which means ‘Let’s wake up’ in isiZulu) program and the Collaborative HIV and Adolescents Mental Health Program (CHAMP). The VUKA program is a cartoon based family intervention aimed at reducing risk behaviors among youth living with HIV/AIDS. It is a 10 session intervention of approximately 3 months duration delivered to adolescents aged 9-14 years and their families. It focuses on negative peer influence, poor financial, family and social support, specific psychosocial problems and challenges such as loss of a parent, difficulty accepting and dealing with identity and status issues related to HIV, stigma and discrimination, disclosure, difficulties in understanding ART and adherence to medication specific to young people living with HIV and their caregivers. The program is ran by a multidisciplinary team of physicians, nurses, psychologists, lay counsellors and researchers, together with patients, artists and educators. According to Bhana et al., (2016) the VUKA pilot trial was carried between 2008, 2010 and 2012. The objective of the study was to examine the contextual, social and self-regulation factors that are associated with positive mental health outcomes among youth living with HIV/AIDS. Youth who were involved in the study showed improvement in all dimensions such as

mental health, youth behavior, HIV treatment knowledge, stigma, communication and adherence to medication.

The CHAMP is developmentally-timed, multi-session, family-based intervention that has been adapted and implemented with HIV youth in South Africa and in the US (Bhana et al., 2014, pg. 3). It was developed to improve parent-child relationship and strengthening the adult protective shield as a protective factor against HIV infection in adolescents. The study showed that there was significant improvement in communication, supervision, monitoring and support and youth mental health and risk behaviors (less time was spent in risky behaviors).

### **Mema Kwa Vijana Support Group in Tanzania**

The MEMA kwa Vijana (which means ‘good things for young people’) intervention in Tanzania, focuses on the prevalence of HIV, other STIs and pregnancy and on sexual health knowledge, attitudes and reported sexual behaviors. A trial by Doyle et al (2010) conducted between 1998 and 2008 in ten different communities in rural Tanzania, focused on behavior change interventions to reduce HIV infection in young people. The interventions consisted of teacher led, peer assisted programs in school education, youth friendly services, community activities and youth condom promotion and distribution. The results of the trial showed that MEMA Kwa Vijana interventions improved young people’s sexual and reproductive health knowledge. Additionally, there was no significant negative impact in the HIV and STIs status either after 3 years or after more than 8 years of the intervention being in place.

### **Mental health services at the Comprehensive Care Centre of Kenyatta National Hospital, Nairobi, Kenya**

Children and adolescents who attend CCC clinics at KNH receive one stop comprehensive mental health services from a multidisciplinary pediatric team of clinicians, pediatricians, nutritionists, nurses, pharmacists, counselors, psychologists, laboratory technologists, social workers, and peer mentors. During routine clinics, the nursing team, which is the first point of contact with the patients, screens them through individual interviews, for problems regarding adherence to medication, disclosure of HIV status as well as common mental health such as depression, anxiety, traumatic stress, conduct disorders and substance abuse. Through a centralized electronic patient management system, patients are referred appropriately to specified service stations for individualized care, and real time data is recorded for ease of management. Patients with identified mental health problems are referred to the psychosocial team comprising counselors, psychologists, social workers, and peer supporters. Patients’ first encounter with the psychosocial team is with the counselor, who facilitates individual counseling in areas such as adherence to medication and/or disclosure. The patient is then referred to a clinician or pediatrician for medical review.

The counselor also screens the patient further for mental health problems using online mental health screening tools. If a problem is identified and it is found to disrupt social and occupational functioning, the patient is referred for further intervention to a

psychologist who conducts a full mental health assessment and makes recommendations. Where there is need for psychiatric review, the patient is booked to see the psychiatrist at the CCC clinic. In case of a nutritional concern, the patient is referred to the nutritionist. Where specialized services such as Family Planning are required, patients are given a consultation note to the Family Planning clinic outside CCC. If psychosocial concerns resulting from home or school environment are identified, the patient is referred to a social worker who conducts a social assessment and makes recommendations. The social worker determines patients targeted for case management and discusses with the multidisciplinary team on appropriate follow up action such as home visits, frequent clinic visits for close monitoring and link to support groups. Home visits enhance holistic family care and improve treatment outcomes. On a regular basis, multidisciplinary meetings are held at the CCC to discuss management plans for patients who experience persistent clinical and mental health concerns that imply treatment failure. Through these discourses, patient follow up is intensified to ensure progress and retention in care. All health care providers follow standard operating procedures to guide their practice. For example the psychosocial team adheres to written protocols for adherence preparation for ART, adherence counseling, disclosure of HIV status to children, mental health management, transition to higher levels of care, and support group therapy.

Peer supporters are also useful in providing additional support in mental health as expert patients. The CCC clinic has two adolescent peer mentors. They may be called upon by other health care works to intervene in one-on-one counseling, where they are needed to build rapport with the patient in order to encourage open sharing. They are actively involved in organizing and leading group educational activities and networks, home visits, accompaniment of patients to clinics outside CCC to which patients are referred, attending to assigned administrative duties, and providing accompaniment to health care workers, to services such as psychosocial support for ward patients, linkage to care and treatment for newly diagnosed patients, and outreaches (for example World AIDS Day, giving presentations at other health care facilities). As they have an edge in being techno savvy, they have been active and successful in mobilizing, motivating and mentoring their peer group. Through communication avenues such as WhatsApp and facebook, the peer supporters have been able to engage and mentor their peers in discussions that seek to address peer related issues. Work is still underway to streamline these interactions so that age appropriate factual messages are conveyed through a consultative feedback strategy that is supervised by a health care worker. They are also resourceful in identifying suitable peer supporters from those who are managing their own health. This helps to beef up the mentoring team to ensure quality individualized follow ups.

In addition to individualized care offered to children and adolescents, the CCC multidisciplinary team conducts regular facility based age appropriate activity based peer support groups through an evidence based differentiated model of care on specific clinic days. These are: 10 to 14 year olds group which meets on Wednesdays, 15 to 19 year olds group which meets on Thursdays, and 20 to 24 year olds group which meets on Fridays. As these groups are still unstructured in their curriculum, the psychosocial team is in the process of streamlining the ongoing programs in order to achieve better and sustainable results that adequately address the felt needs of these age groups. As

the patients engage in support group programs, they are empowered with knowledge and life skills to facilitate a smooth transition to higher levels of care such as from children to adolescent care, and from adolescent to adult care. This approach helps them to grow to be independent and responsible over their own health, and this improves their retention in care. We also have focused interventions that address these adolescents. Specifically, we hold holiday programs which target all children and adolescents who attend CCC clinics irrespective of their treatment status. During these one day forums, the group engages in fun activities and presentations such as singing, dancing, fashion show, drama, personal stories, psycho-education sessions that addresses psychosocial issues specific to each age group, and graduation of adolescents transitioning to adult care. Apart from having the ongoing age-specific weekly peer support groups and holiday groups, the CCC psycho-social team is working towards having needs-specific support groups to address newly disclosed, newly enrolled, enhanced adherence, gender based, emancipated minors below age 18 years.

The CCC has some materials and equipment that enable us to engage this group in adolescent friendly services through, music, game, art, creative writing and public speaking. We also have a growing library whose resources (audio-visual, literary, games, music) are available for use during peer support groups. Over time we have noted improvement in children and adolescents interest and utilization of these materials. In particular, participation in group games has enhanced peer relations and bonding. Availability of reading material has encouraged reading skills in adolescents who previously preferred to spend time on their mobile phones either texting or playing games. These opportunities have continued to help them to adopt healthy habits through peer modeling. We would like to improve and diversify our creative methodologies in order to build treatment literacy and encourage peer led support activities that are relevant to a diverse population.

We are currently working towards improving an ongoing novel outfit that works alongside the peer support groups. Its goal is to motivate children and adolescents to commit themselves to take responsibility over their health and maintain viral suppression. The program, known as Operation Triple Zero (OTZ), is a facility based initiative that is driven by peer led support networks. It uses an asset based approach to offer comprehensive HIV treatment literacy through adolescent responsive empowerment strategies. Recruitment of those willing to join OTZ is ongoing during the peer support groups. We have committed adolescent and young people champions/mentors who lead the OTZ campaign not only within the hospital but also in other health facilities. We are yet to streamline the OTZ framework that would incorporate standard packages and supervision for the members.

Existing gaps in the care and management offered at CCC are many. They include: service, engagement, system, implementation, and community gaps. In the service gap, non medical health workers are not adequately empowered or trained for mental health outreach among children and adolescents. In the engagement gap, healthcare workers are poorly engaged with children and adolescents. In the system gap, there are few and unmatched categories of qualified health care workers, bookings for children and adolescents are not fully aligned with the peer support group schedule, and structures that link mental health services in individual and group sessions are weak. In the

implementation gap, despite the existence of evidence based interventions globally, there is none that has provided evidence for sustainability in comprehensive mental health coverage for perinatally infected children and adolescents with psychosocial needs in Kenya. In the community gap, there are weak community structures for engagement and outreach on mental health support for children and adolescents.

The way CCC has tried to address some of these concerns is by first streamlining appointments by reminding clients as they come for routine clinics. Secondly, liaising with peer supporters already present at the facility to identify suitable peer supporters, by updating information regarding schooling of clients to know their availability. Thirdly, by developing a supervisory team of health workers involved with adolescents and young people to give oversight to improvement strategies. Fourthly, by having the CCC multidisciplinary team continue to work on developing standard packages for adolescents and young people. There is need to further establish tangible national networks and involve the peer groups, as this would enhance ownership of the intervention process. Fifthly, we have been pooling resources (audio-visual, literary, games, music) to enrich our library at the facility. We still need more age appropriate materials that could be used to serve a growing number of children and adolescents and engage them in a more relevant and sustainable way.

The CCC also sees it necessary to empower health care workers and peer supporters through links with national networks and leveraging on consistent healthy communication that drives progress towards positive results. This would necessitate more specialized in house trainings to improve on knowledge, skills and attitude as this team applies the model. Currently, healthcare workers at CCC participate in continuous medical education organized by the management through presentations on work done by health care workers at the CCC. In addition, the CCC management also gives healthcare workers opportunity to participate in professional training in HIV and adolescent health management organized by the Ministry of Health through NASCOP among other organizations outside the facility, on quality improvement methods in health management. The CCC is working to establish clear monitoring and evaluation strategy in order to facilitate the achievement of quality objectives for children and adolescent health care. It is also working to build the capacity of peer supporters, who are highly instrumental in facilitating support groups through their lived experience, yet have limited background training in managing children and adolescent health issues. This would be facilitated through mentorship programs, participation in continuous medical education and trainings, workshops as well as in benchmarking activities with other facilities to enhance experiential learning.

As the CCC is one of the clinics within a hospital with a distinguished status as a national, teaching and referral Hospital, it caters for a diverse population with regards socio-economic, cultural and educational backgrounds. This would necessitate a rich interaction between the clients and health care providers, and also a broadening of the methodology, especially enabling peer support groups to adapt to a diverse population in order to improve treatment outcomes. This would help to build evidence on the impact of services rendered to children and adolescents within the broader context. With the support of KNH and funding through the US President's Emergency Plan (PEPFAR) and the US Department of Health and Human Services Centres for Disease Control and Prevention (HHS/CDC)/University of Nairobi Centres of Excellence HIV Management

partnership framework, the CCC is assured of support for innovative interventions aimed at improving the quality of appropriate health services to children and adolescents that fit within the Kenya AIDS Strategic Framework.

### **Common Elements Therapeutic Approach**

Various evidence based interventions tested in settings like Kenya can be put into practice by task sharing and task shifting methods. The model of peer support and peer training is also an example of such a move from investing in specialist trainings to training lay counsellors and at times peers (Bolton et al, 2014). The psychosocial team intends to utilize a common elements treatment approach (CETA) which has an eclectic flavor and combines strategies from various psychotherapies. In adapting these therapies to a group of HIV positive adolescents what is needed is no substantial changes in the mainstay/core elements of therapies but adaptations and modifications to the settings, peripheral issues ( terminologies, analogies, cultural factors and contexts) (Patel et al, 2011; Verdeli et al, 2008; Murray et al, 2015), which can be achieved by borrowing an implementation framework where these common therapeutic elements are collated, and adopters and mental health systems' ability to innovate these treatments is carefully studied. WHO mhGAP has highlighted the need for evidence based interventions development for vulnerable populations like adolescents and especially those affected by HIV/AIDS. The CETA model combines anxiety, depression, stress/ trauma focused strategies in which lay counselors and peer supporters in Low and medium income contexts (LMIC) can be trained. The core principles of the therapies do not change but the way these are offered and packaged and the ability of the lay therapist or peer supporter to make relevant decisions about the intervention has room for change. While we are not adopting CETA treatment manual but treating CETA as a conceptual model to tie in domains of activities, themes and sessions that we feel our HIV positive adolescents need to learn in order to 'live healthy'.

In embracing the CETA as a conceptual model, we are tying in an understanding of anxiety, trauma, depression, and life skills such as confidence, proactive decision making, social expression and support. The evidence for community based programs or hospital based peer support services for HIV children and adolescents in LMIC setting is very limited. The uptake of evidence based methods and practices have been really limited so far. Our work was guided by the need to improve the quality of mental health services for HIV positive children and adolescents in specialist HIV programs addressing their psychological distress and building their resilience. This is a first step towards strengthening implementation gaps and building professional services in a consultative manner where evidence based psychotherapeutic strategies are tied together in their common elements. We have in principle also tried to incorporate what Chorpita et al (2008) call the move away from 'uptake of evidence based strategies' towards 'generation of positive outcomes' for this vulnerable group of HIV positive adolescents. The focus of the HIV positive adolescent friendly services and mental health programming in Kenyatta National Hospital is to recognize the need to retain the children and adolescents in the continuum of care, providing structured psychotherapy and support at health facility and community health care levels.

We have conceptualized our common therapeutic elements on four tiers as such:

1. *Social-recreational tier* is there to provide a social and recreational association with the group work. It incorporates elements of lightening up, relaxing, mingling and having enjoyable time, thus creating the strong need to ‘de-medicalize’ and create more positive associations with the group coming together as an social and peer support entity.
2. *Peer Modeling tier* is there to use peer support both in the forms of using the psychotherapist/counselor who is available to moderate the session and the peer leader from the group who will lend support, become a bridge between rest of the participants and the group moderator. There is also an element of fostering peer mentorship and using their feedback on problem solving, and sharing/learning from personal stories of successes or failures in their health management.
3. *Psycho-educational tier* seeks to provide greater support in terms of relevant, positive and motivational as well as HIV disease related information and support in measured doses so that the participants are not overwhelmed by the information but use it to enhance their psychosocial functioning.
4. *Psychotherapeutics tier* seeks to build into the work assessing and addressing specific needs such as motivational support, depression and anxiety, shame or stigma. It puts greater emphases on understanding and tapping into emotional and thought disturbances, but done in a way to address these problems and find strategies that children and adolescent participants could adopt.

In this modular approach, we have tried to elicit competencies that the participants and therapists would develop through the support group program, therefore making the task of ‘CETA adaptation’ and providing a structured therapy in the resource constrained environment with high risk patient, more manageable. This work is closely aligned by the suggestions of Borntrager et al (2009) and Kazdin’s (2008) of building evidence based practices in HIV care that have broader set of treatment approaches that incorporate research, clinical judgment, and client-specific needs. Keeping this consideration in mind, the current work is informed by multiple stakeholders from KNH such as therapists on ground offering mental health services at the CCC, the Head, VCT and HIV prevention Unit, and Youth mental health services, the mental health research and capacity building coordinator, a University of Nairobi maternal and child mental health researcher, and clinical psychologists with interests in adolescent HIV related mental health burden who are on the team that is spearheading the process of adapting the CETA at the CCC.

In the readiness to systematize the ongoing children and adolescent support groups at CCC through the current development of the ‘Positive and Healthy Living’ manual, and to create greater fidelity and therapist willingness to adopt evidence based practices to improve the quality of peer groups, the formation of an extensive team that is teachable is very crucial. It is in collaborative partnerships with health care workers at the CCC, in specialist clinics and research settings that the work of communicating relevant clinical and engagement strategies, identification of key problem areas and adolescent friendly attitudes, and uptake would take place.

*With a cohesive, multi-skilled team* the following tasks in care delivery are possible:



1. *Training in a modular approach*, generating culturally relevant and adolescent friendly activities for group work.
2. *Changing the attitudes of health care providers* and mental health workers.
3. *With appropriate compatibility, adopting innovations.*

The broad objective of this work is to distil common elements from evidence based treatments and to shape evidence based practice with a view to maintain HIV Positive children and adolescents in the care cascade and enhance their capabilities. Using the distilling and matching model (DMM) proposed by Chorpita et al (2005), we aim to:

1. *Identify techniques that are most useful* (such as: Should an exercise be cognitively targeted or more behavioral? Should it be individual work or group work?) and bolster it with evidence from patient self-report and therapist experiences (such as: How did you find this experience? Was it difficult to run this activity in the group?).
2. *Match the techniques by gauging the associations between the treatment content and study characteristics* (such as: How does self-esteem or social support become relevant and operationalized in the context of HIV positive children and adolescents experiencing a lot of family adversities) and refine our model or conceptual thinking of the four tiers described above (through constant comparison and discussion among the study team and feed-backing it to the adolescent participants).
3. *Identify which study characteristics matter the most* (such as: the setting factors, children and adolescent key characteristics, and social support available). This would help to have key target outcomes match our final intervention effectiveness.

## **Clinical case scenarios among children and adolescents that are common in mental health practice at the Comprehensive Care Centre of Kenyatta National Hospital**

Below are clinical vignettes from two of the authors, one of who carried out her research at the CCC, and the other who engages in psychotherapy at the CCC. They both share their experiences and offer observations of what they have encountered with children and adolescents living with HIV. These vignettes highlight in part the characteristics of this population and underscore the need for the adaptation of the CETA model in improving mental health interventions at the CCC. In this way, they validate the conceptual foundations of our work.

### **Case scenario from Otsetswe Musindo**

“I consider myself to be very fortunate to have done my research at Kenyatta National Hospital’s Comprehensive Care Centre. The experiences I have had have helped me to broaden my knowledge of working within a HIV care clinic. I had the opportunity to integrate and apply what I have learnt to real life situations. The objective of my research was to assess the neurocognitive function of HIV positive children using a neurocognitive battery tool called KABC-2 and explore their psychosocial factors using the HEADS\_ED screening tool. During my research, I interacted with children living with perinatally

acquired HIV of ages 8-15. Among this group, some understood why they were attending the clinic; others were clueless while for some others their caregivers came up with stories about clinic attendance that didn't make sense. During our interviews, I assessed their psychosocial issues tapping into their home, education, activities and peers, drugs and alcohol, suicidality, emotion/behaviour, and thought disturbance (mapping the HEADSS domains). One of the heart breaking interviews I had, was with a 14 year old girl who lost both parents and was later adopted by her aunt. Since the loss of her parents, she has been transferred twice to different schools because she could not cope in a new environment. She was withdrawn, not doing well at school and has a history of alcohol use. She also had a history of suicidal thinking. The girl had multi-partner relationships and had sex with those different men without ever insisting on the use of a condom. A referral was made for her after the interview, to see a psychologist for psychotherapy.

The majority of the participants in the research attend school and most of the caregivers attest that their children were not satisfied with their performance at school. In addition, during the HEADS\_ED interview tapping on education, I realized that most of the participants were struggling with their studies, either experiencing absenteeism or poor grades. This was evident when assessing their neurocognitive functioning using the KABC-2. However, there was never a dull moment when doing the assessment using the KABC-2, as I the loved the tool despite the struggle my young participants experienced during the test. Most of the participants enjoyed the Atlantis subtest where they are shown pictures of plants, shells and fishes. During the assessment, I observed that most participants displayed inability to sustain attention and were impulsively responding correctly. Some found joy in playing with the tools rather than doing task especially the rover subtest.”

### **Case scenario from Judy Machuka**

“I have had experience with psychotherapy on children and adolescents who attend routine CCC clinics. Majority of the clients who are referred through the cascade of care for psychological review experience one or a combination of the following mental conditions: depression, anxiety, traumatic stress, learning disorders, internalized HIV related stigma, substance use disorder, and conduct disorder. The clients undergo a comprehensive mental health assessment using appropriate psychometric tools, and a management plan is drawn with the client and caregiver. Referrals are made for psychiatric reviews where necessary. Some clients present with comorbid conditions, and this often adds to the HIV disease burden, thereby complicating the clients' adherence to the treatment plan. A typical case is that of June (pseudonym), who is 17 years old. June is the 3rd born of 3 children, the other 2 siblings being 2 years and 8 years respectively, her senior. She completed primary school with a grade way below average, while one of her siblings successfully completed high school and the other attained a university degree, two years ago. She lives with her mother and 2 siblings in Nairobi. Her parents separated when she was young. She occasionally visits her father, who an alcoholic, violent, and has another family. She is not free with her mother, whom she says is unemployed, an alcoholic, and harsh, or even her siblings. However, she is free with her aunt.

June started HIV treatment in 2011. Her adherence to medication has been poor

and she has sometimes missed medication for up to 1 month. She has previously been diagnosed with dyslexia in 2013, convulsion disorder in mid-2015, traumatic stress disorder and depression at the beginning of 2016. She has a history of physical and sexual abuse, which have since left her insecure, secretive and seeking attachment. She is currently sexually active, and uses alcohol and cigarettes. She does not intend to continue with school, and instead would like to undertake a course if she gets finances. She enjoys playing football and swimming. Her management has included individual therapy particularly cognitive behavioural and trauma therapy, family and peer group psychotherapy, adherence and addiction counseling. She has shown improvement in adherence to medication, identity formation and social relations.”

## **Evaluation**

The purpose of evaluation of the adaptation of the CETA model in ongoing children and adolescent support groups at the CCC would be to look at what has been accomplished, how it was accomplished, and to learn how the intervention can be improved. The adaptation of the CETA model would be done through an open implementation trial with a total of 28 participants in differentiated support groups, 7 from ages 10-14 years, 6 from ages 15-19 years, and 15 from ages 20-24 years. This sample typifies an average number of 30 adolescents, 8 from ages 10-14 years, 6 from ages 15-19 years, and 16 from ages 20-24 years, who attend weekly peer support groups at CCC. The trial would be conducted through 8 group sessions held fortnightly on Saturdays between 9:00-10:30am over a period of 8 months. Quantitative data would be obtained through psychosocial assessments administered prior to the start and during the 7th session of the trial. Assessments tools would include: socio-demographic questionnaire, Morinsky Medication adherence Scale, Internalized Stigma Scale, Strengths and difficulties Questionnaire, Rosenberg Self Esteem Scale, WHO Quality of Life Scale, Working Alliance Inventory for participants and moderator, Clinical Outcomes in Routine Evaluation-Outcome Measure, Patient health Questionnaire (PHQ 4 for anxiety and PHQ 9 for depression). These would assess common mental health problems experienced by children and adolescents attending CCC clinics.

A participant satisfaction questionnaire would be administered during the 7th session. The change in measures, which would be observable and measurable, would indicate change in clinical and mental health outcomes. Qualitative data would be obtained from feedback interviews at the end of each session. This would help to assess the experience of participants, moderator and peer supporters, of the group sessions, and it would help to make improvements for future group sessions. Rich qualitative data could also be obtained from individual interviews and focus group discussions 6 and 12 months after the trial from participating children and adolescents, their caregivers and health care workers at the CCC. This data would provide a guide to the impact of the trial using the CETA model.

## **Conclusions**

The basis of using CETA as a therapeutic approach initially focused on three common mental health problems namely, depression, traumatic stress, and anxiety. Adaptation of CETA as an evidence based approach that has positive mental health outcomes in children and adolescent support groups at CCC is expected to improve the quality of services offered to this population. As CETA is applicable for use by health care workers and peer supporters with diverse levels of training and experience in mental health, positive clinical and mental health outcomes are expected from its use. We consider adapting the novel CETA model in ongoing peer groups at CCC in order to improve the quality of mental health care to children and adolescents living with HIV. The context in which we do this is by empowering the available multidisciplinary health care team who have diverse levels of training and experience in addressing children and adolescent HIV related health problems. We anticipate positive clinical and mental health outcomes through improved treatment literacy, identity formation, behaviour and social relations. It is expected that this approach will eventually become a best practice in children and adolescent health care in Kenya, that would serve as a bench mark for other health facilities both nationally and internationally

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# Harnessing Cultural Heritage for Locally Relevant Interior Design Solutions for New Apartments in Nairobi

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## Abstract

Nairobi is currently experiencing a mushrooming of high-rise apartments in tandem with Kenya's growing economy and expanding middle class in the urban areas. This phenomenon is keenly evident in historically low-density residential areas in the western part of Nairobi. It is a transformation driven by a high demand for housing in a city with a rapidly growing population and rising incomes. While these apartments contribute to alleviating the need for housing, their interior designs represent a missed opportunity for innovative and culturally relevant spatial solutions. They are reflective of global North perspectives on apartment living and material finishes. This paper argues that there is a need to re-evaluate how we approach the interior design of these apartments since the new apartments provide an opportunity to develop innovative and culturally relevant spatial solutions for interior spaces that reflect the unique identity of the local African cultural context in the global South. **Relevance to innovation** The paper introduces the concept of appropriate local cultural heritage as an important factor for consideration, and incorporation in the design process, as an integral basis for the development of more creative and innovative interior design spaces for apartments in the global South. The issue is explored through the discussion of new apartments currently under development in a neighborhood in the western suburbs of Nairobi; the purpose being to provoke debate on ways in which the European-inspired apartment interior designs and finishes could be re-conceptualized to generate interior design solutions that are better suited for the African context of Nairobi.

**Keywords.** Apartments, Cultural Heritage, Design Practice, Interior Design, Kileleshwa

## Introduction

Over the last decade, Nairobi, the capital city of Kenya, has experienced rapid population growth, high economic growth, and with it rising incomes and a growing middle class: Nairobi's population as at the last National census in 2009 was 3.1 million (KNBS, 2010).



By 2014, its population had increased, significantly, by 30 percent, to 4 million (World Bank, 2014). The rise of the middle class in Kenya, many of whom are domiciled in urban areas such as Nairobi, as is typical of many cosmopolitan cities, has been documented as rising steadily between 2006 and 2012, from an estimated 3 million to 5 million (Shah and Ruparel, 2016). (See Figure 2). The above factors have arguably driven the demand for housing, which in the western suburbs of the city, has resulted in the transformation of low-rise single family residential buildings such as bungalows into high-rise apartment type housing. Apartments are now the largest segment of the housing starts in this part of the city. In the latest report by the Kenya Bankers Association (KBA), apartments constituted 60 percent of residential sale transactions (KBA, 2017) thus making them the most significant type of residential building favoured by developers to meet the housing demand of the middle class.

While the new apartments are a welcome contribution to meeting the housing demand of the expanding middle class, defined as having incomes between 23, 670 and 199, 999 Kenyan shillings (Standard Digital, 2015), their interior designs, as currently manifested, do not represent an appropriate nor innovative spatial articulation of interiors within the local African cultural context of Nairobi. They represent a direct imitation of perspectives from the global North on apartment living and material finishes.

However, given the emergence of apartments as the predominant form of formal housing they do represent an opportunity to harness cultural heritage for the development of innovative, culturally relevant and appropriate solutions for interior spaces that reflect both the cultural African context of the global South and appropriate culturally defined aesthetic sensibilities and values.

The need to articulate ways in which cultural heritage can be harnessed for local interior design solutions for the upcoming apartments is the focus of the discussion in this paper as is the need for interior design professionals and educators to debate, articulate, and define what these cultural values are or ought to be and to encourage their incorporation in both professional practice and the training of interior design students.

Arguably, one can only be second best in emulating others but the best if one is original and innovative; and drawing from the local African cultural heritage affords local interior designers an opportunity to be relevantly creative, and to forge a unique design identity in their spatial solutions.

## **Method**

A qualitative approach was adopted for this study. The methods employed in this investigation were a combination of both case study and document review: A case study of a fast transforming residential neighbourhood, Kileleshwa, situated in the western suburbs of Nairobi city was undertaken. Kileleshwa, located just 4 kilometres from Nairobi's Central Business District is an extreme example of rapid physical transformation from low-rise residential bungalows to high-rise apartment buildings currently taking place in the western residential zone of the city. It is the interiors of these apartments that formed the locus of the empirical study which included observation and photographic documentation of apartment interior spaces. A document review of relevant literature was

undertaken to augment the field observations made during several site visits to various apartment blocks in the neighbourhood. The focus was on the characteristics of the interior designs implemented in the various apartments as well as those featured in the promotional materials of these developments including brochures and project websites.

## **Results and discussion**

Issues related to cultural heritage, apartment characteristics in the case study area, and possible means of developing the appropriate local cultural heritage are discussed in three separate thematic topics.

### **Value of cultural heritage**

The United Nations Educational, Scientific and Cultural Organization (UNESCO), the United Nations body charged with the conservation of world cultural heritage, recognizes the importance of cultural heritage as broadly conceptualized to encompass not only, cherished historic monuments and museums, but also, traditional practices and contemporary art forms (UNESCO, 2016). The organization also acknowledges the link between cultural heritage and creativity as encapsulated in this statement, “Both heritage and creativity lay the foundations for vibrant, innovative and prosperous knowledge societies.” (ibid). UNESCO has, over the years, developed a number of cultural conventions that pay homage to the importance of various dimensions of cultural heritage. The notable conventions include: The Convention on the Protection and Promotion of the Diversity of Cultural Expressions (2015); The Convention for the Safeguarding of the Intangible Cultural Heritage (2003); The Universal Declaration on Cultural Diversity (2001); and, The Convention for the Protection of World Cultural and Natural Heritage (1972). (ibid).

The 2015 and the 2003 conventions seek to promote the diversity of cultural expressions and safeguard the intangible cultural heritage respectively. Especially significant is the definition given by UNESCO for intangible cultural heritage, which it defines as: the practices representations, expressions, knowledge, skills as well as the instruments, objects, artefacts and cultural spaces associated therewith that communities, groups and, in some cases, individuals recognize as part of their cultural heritage. (UNESCO, 2016b).

UNESCO goes further to point out that the:

intangible cultural heritage, transmitted from generation to generation, is constantly recreated by communities and groups in response to their environment, their interaction with nature and their history, and provides them with a sense of identity and continuity, thus promoting respect for cultural diversity and human creativity. (UNESCO, 2016b).

Thus, UNESCO clearly identifies the parameters for understanding a dimension of cultural heritage; intangible cultural heritage, and points out its relevance to creativity. Okumu notes further that the 2003 UNESCO convention, proposes five broad ‘domains’, that he identifies as, oral traditions and expressions, including language as a vehicle of the intangible cultural heritage; performing arts; social practices, rituals and festive

events; knowledge and practices concerning nature and the universe; and traditional craftsmanship. (Okumu, 2016, p.45) This makes clear the richness of the concept of cultural heritage even when limited to the dimension of intangibility.

Legislation exists in Kenya on cultural heritage but as Kyule argues, it is, “outdated and unresponsive” and “inadequate to attract and sustain beneficial interest in cultural heritage” (Kyule, 2016, p. 30). However, contrarily, Okumu argues that the presence of policies such as, the National Policy on Traditional Knowledge, Genetic Resources and Traditional Cultural Expressions, the National Policy on Culture and Heritage, the Policy on Traditional Medicine and Medicinal Plants and the Constitution of Kenya (2010), are all evidence Kenya’s efforts to safeguard, “the wisdom in traditional knowledge and traditional cultural expressions.” (Okumu, 2016, p. 53). Nevertheless, the reality on the ground is that despite an acknowledgement on paper of the importance of cultural heritage, its lack of proper implementation results in its failure to be prioritized in areas of opportunity such as residential building construction. Okumu, acknowledging the significance of cultural heritage, notes that Intangible Cultural Heritage is important for not only, “present and future identities,” but also, “innovation and development.” (Okumu, 2016, p. 57)

### **New apartment characteristics**

Kileleshwa, is a suburban residential neighborhood situated in the western suburbs of Nairobi. It is a neighbourhood that has experienced rapid transformation over the last decade. Kileleshwa is but an extreme case of the radical changes in housing occurring in this western zone of the city. From a leafy green suburb, dominated by single story, single family houses predominantly in the form of bungalows, it is fast transforming into a high-rise residential apartment zone. Whereas it historically had no skyline to speak of, it is now dominated by apartments with heights ranging from four floors to thirteen floors; this despite extant regulation limiting the height limit to four stories and mid-rise housing type to townhouses. The emergent apartments, despite issues related to inadequate infrastructure, will no doubt become the dominant housing type in the area as the bungalows are eventually replaced by apartments.

It is noteworthy, however, that a number of the more significant apartments, both in terms of height and expansiveness, are either foreign owned or being developed by foreign contractors or a combination of both. A case in point is the apartment development called Signature Apartments (See Figure 1) that is both Turkish owned and developed. Of interest are the interior finishes of these apartments that number 110 units, on 12 floors, in 4 blocks, and on 1.3 acres of land. One of the promotional strategies for marketing the apartment units is the promise of a bonus of a fully furnished apartment if purchased in cash. In a recent advert on a local television channel, the apartments are being advertised as having European style furniture. That this should be an appealing marketing strategy is indicative of the values held by the targeted purchasers; the rapidly growing middle class of the city, who are driving the demand for apartment housing close to the Central Business District (CBD).

Signs of a growing middle class in Kenya, and primarily in urban centers are readily apparent: Shah and Ruparel have documented the steady rise of this middle-income group



Figure 1. Signature Apartment, a high-rise apartment block under construction in Kileleshwa (author, 2015)

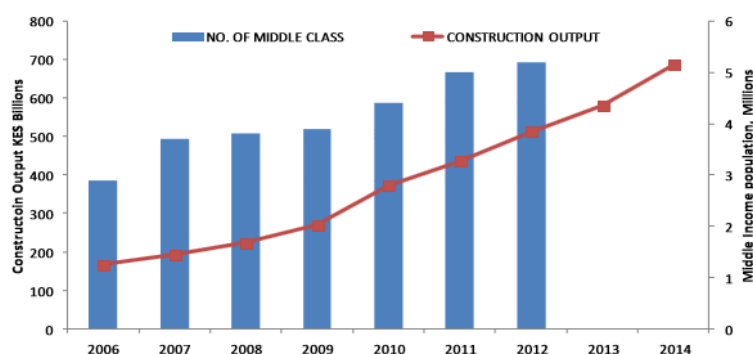


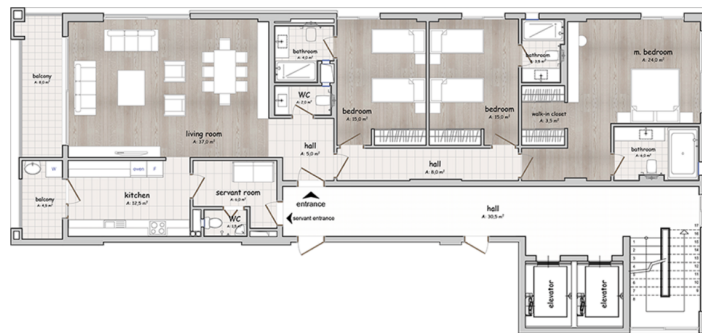
Figure 2. The rise of the middle class in Kenya in the new millenium. (Shah and Ruparel, 2016)

since 2006. (Shah and Ruparel, 2016). (See Figure 2). Other indicators of the growing opulence of this income group include: the rise in personal vehicle purchases, with new vehicle registrations averaging 14,195 between 2006 and 2016 (Trading Economics, 2017); the mushrooming of large malls (See Figure 3) boasting of foreign anchor tenants; as well as the increase in American international brands, on the local fast food scene, such as Domino's Pizza, KFC, Burger King, Cold Stone, and Subway. The indicators, it can be argued, symbolically suggest the desire of the upwardly mobile middle class, with increasing disposable incomes, to identify with the global North culture and values as indicative of their 'success'.

While the emergent apartments make a significant contribution towards meeting Kenya's housing deficit, estimated at 150,000 units (Mutai, 2016), and more so, for the urban residents who make up almost 30 per cent of Kenya's population (World Bank, 2015) the designs of these new apartments raises important questions regarding the appropriateness of their aesthetic expression in Kenya's local context.



**Figure 3.** The recently developed HUB Mall in the Karen suburb of Nairobi



**Figure 4.** Signature Apartments standard floor type - 166.5 sq.m. (Signature of Kenya, 2017)

An analysis of the interior designs of the new apartments is indicative of the importation of foreign ideas without any consideration of the incorporation of Kenya's cultural heritage. The finishes are a direct copy of European design which has its own cultural premise. (See Figure 4): All the interior planes from the walls to the floors and ceiling do not echo any African theme; the furniture displayed is of the European modernist aesthetic; the curtains do not have any motifs that reflect the local African culture; and the light fixture represents a particularly European idea of abstract sculpture. (See Figure 5). The layout of the plan is based on the modernist approach to spatial articulation and the material finishes are imported rather than locally derived. The overall look is of very high quality but the space could fit appropriately anywhere in the global North. Nothing of it reflects the local context. The design can arguably be attributed to the effect of globalization where the values and culture of the global North predominate at the expense of local values.

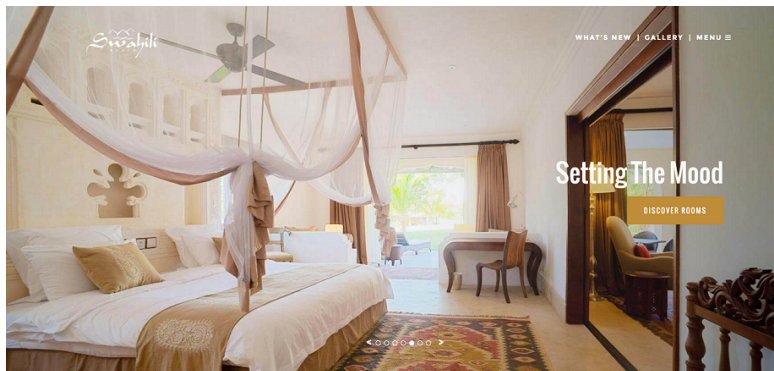


**Figure 5. Signature Apartments proposed European style interior finish (Signature of Kenya, 2017b)**

### **Possible Directions**

The new high end apartments coming up in Nairobi, as exemplified by the case of Kileleshwa are indicative of a prospering economy, rising incomes, and flows of global finance. While this is welcome for the development of the country's economy, there is a need to balance economic development with other important dimensions such as the cultural values of the country. In a world where sustainable development is the prevailing zeitgeist, the embrace of cultural heritage will go a long way in contributing to a sustainable future in which diversity in all its manifestation is valued.

Possible ways of promoting cultural heritage through the interior designs of the new apartments is to begin to grapple with what a locally appropriate aesthetic sensibility ought to be and how it may be made manifest in apartment interior design both in terms of layout, form, and material finishes. An appropriate aesthetic sensibility could be informed by an African design perspective which speculatively can be described as, 'one that privileges the African context with its inherent cultural, aesthetic, and social values[and] borrows from the principles of its traditionally ways of designing.' And further, that it should be, 'essentially about the appropriate orientation.' being locally appropriate and taking cognizance of cultural, social, aesthetic, and other indigenous resources and incorporating them in development approaches, in this case residential housing, to ensure that the outcome is sustainable development understood from the broader more holistic perspective of including the tripartite dimensions of the economic, social, and the environmental [as enunciated in WCED, 1987] 'held in their proper hierarchical relationship.' (Makunda and Hakan, 2016). The important point here being that the superficial approach to paying homage to African aesthetics as a merely decorative addition has to be replaced by an approach that fully integrates underlying principles in the entire interior design of the residential space. Some good examples exist in the Kenya's hotel industry where greater effort seems to be placed in striving towards a locally appropriate integrated design solution for interior spaces especially in terms of form and material finishes. (see Figure 6)



**Figure 6. A room in Swahili Beach Hotel that appropriately echos the local coastal context (Swahili Beach, 2017)**

On 4th June 2016, the Ngorongoro Declaration on Safeguarding African World Heritage as a driver of Sustainable Development, was made in Ngorongoro, Tanzania. The declaration recognized the value of Africa's intangible and tangible cultural and natural heritage, and declared, in part that: 'African heritage is central to preserving and promoting our cultures thereby uplifting identity and dignity for present and future generations in an increasingly globalized world.' (UNESCO, 2016c). This declaration marked an important milestone in highlighting the importance of African cultural heritage. The privileging of local cultural heritage in the African context in all aspects of development including the real estate development of apartments would be consistent with the declaration and therefore deserves to be part of the discourse of figuring out how precisely to do so.

The newly developed curriculum for the new interior design degree, Bachelor of Interior Design (BID) that was approved in 2016 and is set to be implemented in May 2017 at the School of the Arts and Design, University of Nairobi, presents a welcome opportunity for the development of appropriate concepts in relation to the local cultural heritage in the development of appropriate interior design solutions for upcoming apartments. Students should be introduced to African themes and challenged to contemplate how the incorporation of aspects of the local African cultural heritage can foster the development of more creative and appropriate interior design solutions not only for new apartments but also for other commercial and institutional interior spaces. Interior design students challenged to incorporate African themes to solve interior design problems have been noted to be not only engaged in the problem-solving task but have also been found to come up with more creative solutions probably due to being forced to think outside the box, and to value their own cultural heritage. (Makunda, 2015). The students could also be encouraged to take advantage of locally available resources that would serve to expose them to the local African cultural heritage. This includes: The National Museums of Kenya and especially the Murumbi Collection at the The Nairobi Gallery; The National Archives of Kenya; Bomas of Kenya; and the African Heritage House and book by Alan Donovan that showcases elements of African cultural heritage, and especially its spatial expressions (Donovan, 2004).



**Figure 7. Living room of African Heritage House, Nairobi**

Interior design practitioners have a unique opportunity for experimenting and developing the appropriate aesthetic sensibilities anchored in local cultural heritage as they undertake their interior design projects. This would not only enable them to develop a unique identity as distinct from the global North, but also arm them with a well-spring of appropriate inspiration for creative solutions that are reflective of the local context. In other words, instead of copying the global North and coming up second best, they would be taking the leading in developing an original conceptual approach to interior design solutions that would result in an identifiable identity that not only conserves but celebrates their tangible and intangible cultural heritage.

## **Conclusion**

This paper has highlighted the neglect of local African cultural heritage in the development of spatial design solutions for interior spaces of new apartments in the western suburbs of Nairobi, drawing from an example from one of its residential neighbourhoods; Kileleshwa. The importance of cultural heritage and its value both for identity and creativity, and otherwise, as articulated by UNESCO in its various conventions, as well as by the Ngorongoro declaration that emphasises the value of African cultural heritage for development, has been brought to the foreground. The paper suggests the incorporation of local cultural heritage in the development of the interior design of new apartments. It proposes possible ways of doing so as including: the contemplation of ways in which this local cultural heritage can be integrated in interior design solutions for various interior spaces both residential and others such as commercial and institutional spaces; taking advantage of the new curriculum for the new interior design degree, Bachelor of Interior Design (BID), as an avenue for inculcating and exploring ways of incorporating local African cultural heritage in the development of spatial solutions for various interior design spaces; and, suggesting that interior design practitioners grapple with the meaning of



local African cultural heritage through experimentation in order to not only develop a unique identity but also generate locally appropriate creative solutions. Various cultural resources, such as those available through The National Museums of Kenya, The National Archives of Kenya, and African Heritage House have also been highlighted. It was not the intention of this paper to prescribe how local African cultural heritage ought to be understood and articulated nor to describe the appropriate aesthetic sensibilities for interior design in a country in the global South, but rather to provoke and stimulate a much needed discussion and debate on how to understand, interpret, and integrate local cultural heritage, and develop the appropriate aesthetic sensibilities, in creative and innovative interior design solutions, especially for the new apartments that are rapidly emerging in one of the suburbs of Nairobi city, and beyond that, also for other spatial interior spaces in an African city.

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## **Image Credits:**

- Figure 1: Photograph of Kileleshwa taken by Collins S. Makunda taken in Dec., 2015.
- Figure 2: Shah, S., and Ruparel, R. (2016). *The transformation of the Housing Finance Company of Kenya*. Centre for Affordable Housing Finance in Africa (CAHF), Johannesburg. p.3. Retrieved from <http://housingfinancafrica.org>
- Figure 3: Photograph of Kileleshwa taken by Collins S. Makunda taken in Dec., 2015.
- Figure 4: Signature of Kenya. (2017). Retrieved from [http://signatureofkenya.com/#standart\\_plan](http://signatureofkenya.com/#standart_plan)
- Figure 5: Signature of Kenya. (2017b). Retrieved from [http://signatureofkenya.com/#triblex\\_ic](http://signatureofkenya.com/#triblex_ic)
- Figure 6: Swahili Beach. (2017). Retrieved from <http://www.swahilibeach.com/>
- Figure 7: Trip Advisor. (2017).

*Harnessing Cultural Heritage for Locally Relevant Interior Design Solutions for New Apartments in Nairobi*

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# Implementing Enhanced Early Childhood Development Package, Leveraging m-Health and Using a Task-Shifting Approach in Kenya

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## Abstract

The WHO/UNICEF have recently disseminated the Care for Child Development curriculum for training community health workers (CHWs) to provide counseling on early childhood development to parents during routine home visits in low resource countries. We propose to integrate it with a 'human-computer hybrid' platform that functions as a 2-way SMS communication tool to engage parents on ECD issues and empower CHWs to provide psychosocial support on a more frequent basis. We will identify high risk, vulnerable families to augment in-person and mobile interface to further address mental health, community health promotion model and early childhood development. We will also identify three areas of growing concern which include engagement with male caregiver/s, high risk parents/mothers and deepening psychosocial support over mobile interface. Finally, we will address how our hybrid model integrates several ECD and MCMH approaches in offering a unique community health promotion framework, health workforce and parental empowerment.

**Relevance to innovation.** The proposed model of ECD delivery leverages on existing mobile technology to enhance efficiency and supervision of the delivery of ECD packages developed by WHO. It is a process innovation for public use that is aimed at improving neurodevelopmental outcomes for children and can be used in any low income setting with access to mobile technology and trained health personnel.

**Keywords.** Care for Child Development, Community Health Workers, Early Childhood Development, Mobile technology, World Health Organization

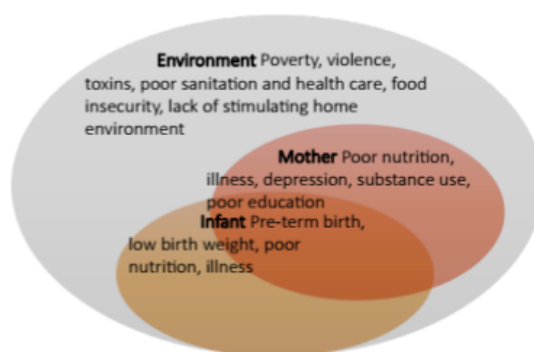
## **Introduction**

Maternal and child mental health still remains an area requiring tremendous innovative services delivery worldwide and more so in Kenya. The WHO and UNICEF have recently disseminated a manualized curriculum (Care for Child Development) for training community health workers (CHWs) to provide counseling on early childhood development to parents during routine home visits in low resource countries. The curriculum piloted in other countries has been shown to improve child developmental outcomes. In Kenya though, CHWs are a fragile work force and therefore innovative, low cost strategies are needed to support this global initiative. Even in optimized, well-funded circumstances, CHWs are hard-pressed to provide a complex array of health services to all vulnerable families in their catchment.

One innovative approach is to integrate the CCD curriculum with a ‘human-computer hybrid’ platform that functions as a 2-way SMS communication tool. In this paper, firstly, we will lay out our conceptual model. Our model proposes to disseminate critical information to CHWs on ECD and simultaneously disseminate a mobile portal to engage parents on ECD issues and empower CHWs to provide psychosocial support on a more frequent basis. Our proposed model is innovative as it would use an existing WHO developed ECD manual to be modified for local use. The platform would automatically deliver timely, personalized weekly messages, and enable user-friendly 2-way counseling dialogue between community health workers and caregivers. Messages would target infant development, maternal- and paternal-infant interactions and parenting practices, and infant feeding and growth outcomes. The platform would allow frequent counseling at flexible times and without need for transit. Secondly, in addition to laying out a roadmap of our model, we also identify three areas of opportunities for innovation which include engagement with male caregiver/s, Identification of high risk parents/mothers, and deepening psychosocial support and over mobile interface as areas needing further work. Thirdly, we will embed these concerns in ECD and MCH care delivery related implementation gaps and finally we will address how our hybrid model integrates several ECD and MCMH approaches in offering a unique community health promotion framework, health workforce and parental empowerment along interface with innovative mobile early childhood development delivery service.

## **Background**

An estimated two hundred million children in low and middle income countries (LMICs) live in poverty, and may fail to reach their full developmental potential due to a number of environmental, maternal and infant factors that often occur in combination (Walker et al 2011; Jensen et al 2015) (Fig.1). In 2010, the global cost of early growth faltering in developing countries was estimated at \$176.8 billion in future earnings (\$34.2 billion in sub-Saharan Africa). In the same year in sub-Saharan Africa, 43.8% of children aged 3-4 had either low cognitive or low socio-emotional skills or both (Mccoy, DC Plos Medicine 2016), and cofactors for lower scores included poverty, stunting, and poor stimulation. Caregivers can play an important role in mitigating the negative effects of these stressors on child development outcomes in early childhood, through quality caregiving. Caregiver



**Figure 1. Environmental, maternal and infant factors that compromise infant development often overlap**

behaviors associated with responsiveness, nurturing, and stimulation are protective and promote infant development in spite of environmental and biological risk factors (Walker et al, 2011; Yousafzai et al 2014). These interventions are a practical target for intervention at scale. In studies of under-nourished children who were followed for 2 decades in the Caribbean, providing mothers with simple counseling on parenting skills translated to higher earnings later in life, suggesting simple early childhood interventions can limit the economic cost of early malnutrition (Gertler P Heckman J et al. Science 2014).

### **MCH and ECD context in Kenya**

Health systems in Kenya are overburdened and under-resourced, limiting implementation of individualized developmental interventions for children. Despite the strong evidence base for developmental interventions, their utilization in LMIC settings such as Kenya has been limited by a lack of staff and resources to deliver individualized therapies, and home visits. It is important to develop low-cost sustainable approaches that are appropriate for use in severely resource-constrained settings without compromising quality.

A significant proportion of the population of Kenya lives in informal urban settlements. These settings are very highly congested with temporary homes and no social amenities including sanitation, clean water, lighting and security. HIV infection rates are relatively high and access to healthcare and proper nutrition is poor. Unemployment rates are constantly high and when employed the majority are casual workers in the informal sector or low-wage earners in industry. Household resources are often minimal, affording only basic survival. Infrastructure, resources and knowledge to support early childhood development are poor. Most adults lack maternity or paternity leave, minimizing contact between infants and parents, particularly fathers. Options for childcare outside of the home may consist of a one-room shack with mattresses, where a single individual may care for 20-30 children of various ages. Other childcare options may include grandparents, who are often illiterate, elderly or disabled.

However, these communities do have access to mobile phones. Recent initiatives have

improved ante- and postnatal clinic attendance. These two positive factors provide an opportunity for simple, SMS-based interventions that are aligned with existing health facility services to benefit this vulnerable population lacking in time, resources and paternal involvement in child upbringing.

### **Low resource approaches to ECD in other settings**

In Uganda, 12 volunteer, peer-educator group sessions improved child cognition and language and maternal depressive symptoms (Singhla et al 2015). Other low-cost approaches involve community health care workers (CHWs). The WHO and UNICEF have disseminated the Care for Child Development (WHO, 2012), a manualized curriculum which can be used to train low-skill health workers to counsel caregivers and promote responsiveness, sensitivity, and age-appropriate communication and play during routine home visits. In a community-based cluster randomized trial in Pakistan, the CCD intervention improved infant cognition, language and motor development following 24 monthly home visits (Yousafzai AK, Rasheed MA et al Lancet 2014). In another recently conducted Caribbean study, CHWs delivered 5 20-minute group-based parenting sessions 3-monthly clinic visits which improved child cognition at 18 months (Chang et al 2015).

### **Few data for cost and child development interventions in LMICs**

A 2014 systematic review identified seven studies aimed at estimating cost-effectiveness of early childhood development interventions (Battura et al 2015) each of which involved parenting interventions focused on conduct disorders, and either home visits or practice-based delivery models. Two cost- and cost-effectiveness studies from LMICs (Pakistan and Nicaragua) have been published recently, both involving CHW-based approaches in which health, nutritional, and child development counseling was delivered during individual home visits (Gowani et al 2014; Lopez et al 2014). These studies are promising, because they demonstrate relatively low annual costs per child (\$37-48) within the context of incremental gains in child development measures at scale. Other low-cost approaches have usually involved community health care workers (CHWs), and exploration of a collaborative care cascade and integrating nutrition and maternal health in their intervention (Murray et al 2016; Zafar et al 2016; Murray-Kolb et al, 2014). Although CHWs are likely a valuable resource for advancing maternal child health initiatives in resource poor-settings (WHO, 2007), their coverage of households within a community may vary (Aridi et al 2014), and it is plausible that adding high quality child development support to existing services may compromise other initiatives. As national health systems and supporting non-government programs strive to incorporate parenting interventions into their activities in sub-Saharan Africa, acceptability, feasibility, and cost studies are needed within this context to inform design of affordable models for delivery. We hypothesize that combined mHealth-based and human delivery models are a plausible approach to lowering costs while enabling scaling-up reaching higher coverage.

The increased uptake of mobile network coverage, the rapid expansion in mobile phone penetration along with affordable costs of phone services and a large scale mobile banking that is most benefitting the poorest of the poor in Kenya has offered a tremendous

opportunity to overcome infrastructure, human resources, specialized information and communication barriers of health systems in Africa (Malar et al 2014; Murray-Kolb et al 2014).

## Method

### Computer-human hybrid SMS delivery models could allow remote ECD delivery

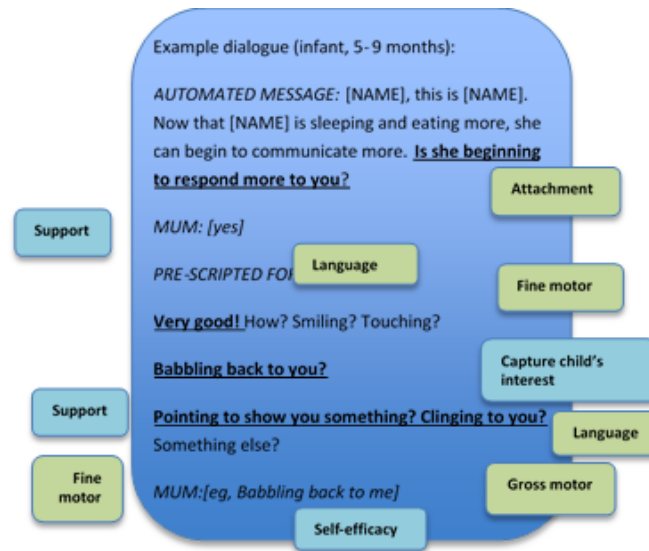
Human-computer hybrid communication platforms combine strengths of computer- and human-delivery models (Perrier et al, 2015). In a prototype human-computer hybrid (Mobile WACH) system recently developed and implemented in Kenya, pregnant women received standardized messages encouraging antenatal care, birth planning, facility delivery, and family planning (Perrier et al 2015). The system allowed combined standardized tracks of automated messages for efficiency, but also provided a platform for two-way dialogue with a nurse that was user-friendly for both facilitator and recipient. Efficiency was enhanced by developing standardized responses that were incorporated into ‘manual’ in the moment dialogue. The platform allowed ready access to key clinical demographic and clinical information and prior conversations for each participant. Messages included a question tied to the content of the message:

**Sample Mobile WACH message:** ‘[Name], this is [Name] Are you having trouble breastfeeding? Giving the baby other fluids can cause illness and weakness. Please continue to only give breast milk to your baby for at least six months. How long do you plan to breastfeed?’

Two-way dialogue allowed opportunity for social support, counseling, and problem-solving that was tailored for a specific recipient. Recipients of the platform had higher uptake of family planning and breastfeeding (Unger JA et al, 2015). We propose that parenting counseling messages, such as those provided as part of the WHO CCD curriculum could be successfully integrated into a computer-human hybrid platform. This approach may offer a low cost mechanism to provide high frequency of counseling interactions, and increase population reach by eliminating need for travel.

Using the computer-human hybrid system, community health workers who receive standard CCD training could deliver the intervention remotely, rather than via a home visit, as in current CCD delivery in Kenya. The automated system would enable timely, personalized weekly messages, but would still allow user-friendly 2-way counseling dialogue between community health workers and caregivers. Messages will be crafted to provide age-appropriate, timely infant feeding, health, and child-development counseling. Child-development counseling messages will integrate emotional support and praise, maternal behaviors to support development, infant developmental areas, and support for infant feeding (Figure 2). The platform could allow frequent counseling at flexible times and without need for transit. In addition, the human-computer hybrid mechanism offers unique training benefits not afforded by standard in-person counseling, because interactions between facilitators and supervisors can be monitored and reviewed remotely and in real-time. Use of pre-scripted response messages may also provide ongoing





**Figure 2. Sample Computer-human hybrid dialogue supporting ECD.**

reinforcement of ECD concepts. These features could be particularly appealing with regard to implementation in the context of Kenyan community health workers, who have little opportunity for in-person supervision and skills-building.

## **Opportunities for innovation in ECD and MCH context**

### **Paternal involvement**

Fathers and male partners are an important, under-targeted support for mothers within households, facilities, and communities. There is limited data regarding specific paternal involvement domains that are modifiable in this community. In an evaluation of the World Bank-assisted project on Nutrition and Early Child Development in Uganda, caregivers were more likely to report attitudes in favor of father involvement than in the control; however, father attitudes did not change (Britto et al. 2009). In Malawi, mass media campaigns resulted in father higher participation in antenatal care visits, delivery, and postnatal care visits (Zamawe et al 2015). SMS-based interventions warrant consideration in efforts to improve paternal involvement in child-rearing in the Kenyan context.

### **Supporting self-efficacy in parenting**

Caregiver behaviors are influenced at least in part by their self-efficacy (the belief that they are effective at parenting) (Klein, 2004 #426). Based on the Social Cognitive (Bandura, 1998#492) we hypothesize that the two-way SMS counseling will strengthen maternal caring capabilities of agency and self-efficacy in addition to knowledge, and social support [Yousafzai AK, Lancet 2014, Matare, 2015#491; Klein, 2004#426; Engle, 1999#493]. These capabilities will in turn promote behaviors to supporting early child

development. It is important to recognize that SMS counseling may not be sufficient for supporting parenting behavior change. SMS relies on maternal interest and engagement, does not afford opportunity for direct observation of mother-infant interactions, modeling of desired behavior, or practice and role-play with in the moment feedback (Fig. 2). On the other hand, a human-computer hybrid platform could provide perception of individualized, interpersonal interaction, particularly if standard messages incorporate timeliness (appropriate to the age of the child), personalization (use of the caregiver's and infant's name), actionable messaging, and open-ended questions crafted to engage dialogue. Thus, two-way SMS may provide social support, and potentially could be leveraged to instill self-efficacy.

### **Reaching high-risk caregivers**

A number of systematic reviews of parenting interventions focused on LMICs have been conducted (Engle et al 2014; Aboud et al 2015, Engle et al 2007; Nores et al 2010], and have identified relatively few RCTs of child development interventions originating in sub-Saharan Africa. Pre-term birth (Blencow et al 2013; Gladstone et al 2015), and stunting (Ricci et al 2006), are highest, or among the highest in Africa, and the need for high quality, intensive interventions for child development may be greatest in this region. With one exception (Singhla et al 2015), studies of early childhood development interventions in Africa have involved intensive programs involving frequent and numerous home visits, skilled-staff or both (Klien et al 2004; Boivin et al 2013; Potterson et al 2010; Boivin et al 2013; Cooper et al 2009). In other regions of the world, parenting interventions that focused on certain subsets of high risk infants, such as low-birth weight infants (Nahar et al 2012; Hamadani et al 2006) undernourished infants (Nahar et al 2009; 2012; Hamadani et al 2006; Powell et al, 2004; Gardner et al 2005) have involved daily, weekly or fortnightly individual clinic sessions or home visits. As approaches to streamline early childhood delivery models take shape in sub-Saharan Africa, it will be important to compare the benefits of these approaches for high versus low risk infants and determine best practices for reaching high-risk dyads.

### **Hybrid implementation effectiveness design: extending m-health innovation to grassroots**

Several components of our design are novel in that there is hybridization at the level of technology-human interface, at the level of training CHWs, MCH and ECD personnel that incorporates parenting, mental health and child development and addresses knowledge, resource and service implementation gaps by developing a portal that is potentially highly sustainable given the large scale use of mobile technology in low resource households. Our intervention would offer knowledge exchange (imparting of knowledge between different producers to different consumers of the knowledge), and knowledge transfer (getting knowledge out from producers to the potential users) from the CCD guidelines to CHWs who would be mastering a new portal of exchange and reaching out to the families and individual caregivers via SMS. In this process our efforts are geared towards capacity building at several tiers: a) enabling Kenyan researchers to review, critique and evolve

critical mental health overlaps between ECD and MCH programming and include male caregivers through our adjoining qualitative work, b) we visualize the Mobile WaCH technology as a skills and knowledge transfer for the overburdened, under-resourced CHWs and other health workers who can use the portal to connect in timely and efficacious manner with needy families through rigorous training and evaluation and the novelty also lies in c) engaging families in a technology that they trust and are efficient in using. We conjecture that we would be able to strengthen the capacity of the caregivers to engage with child development and parenting issues via this medium that protects their time, privacy and offers exclusivity of interaction, In this hybrid type 2 design, we are strengthening clinical effectiveness of this mobile ECD technology while immersing ourselves in addressing implementation barriers of face-to-face reaching out to families, paucity of CHWs and their poor training credentials etc.

In our mobile ECD implementation framework, new knowledge is being generated and tested at the same time (Curran et al 2013). We are testing the ability of the providers (primary health system, CHWs, select MCH and ECD workers) in immersing in the mobile portal engaging the key consumers-caregivers in vulnerable family and community contexts. Some of the caregivers features such as male involvement in parenting, high poverty and food insecurity, poor maternal health etc are also features which we are assessing in terms of how the mobile interface bolsters these social determinants of health. These features we know moderate the future of how well these technologies can address public health burden. At the system level, we establish a researcher-primary care partnership in the service of low cost, high impact mobile ECD interface that would significantly impact families. We have taken all contextual factors (as proposed by models such as Consolidated Framework for Implementation Research (CFIR) and Promoting Action on Research Implementation in Health Services (PARIHS) (Naik et al 2015) and we feel the mixed methods arm of our study would provide some pointers to how community based participatory research model of mobile enhanced ECD delivery would evolve for resource constrained Kenyan families. The local practical experiences and constraints of the families, caregivers, and health workers would provide us with meaningful data to iterate the computer-human interface and despite the complexity that appears to be evident in such designs we are embracing a systematic study of barriers and facilitators to uptake of this innovative practice at multiple tiers.

Our strength also lies in research partnerships that are highly complementary, egalitarian and multidisciplinary. With partners from pediatrics, global health systems research, HIV research and mental health, we have been iterating with grassroots researchers based in ECD context, high vulnerable families from informal settlements, HIV care clinics to address how caregivers fare, fear and what challenges they encounter in providing care for their children. mental health professional from diverse backgrounds have been deliberating on the content of the SMS messages discussing how to adapt the CCD core messages into a comprehensive culturally relevant and easily accessible form for caregivers. Over the years our group has felt very strongly about empowerment of CHWs and other allied health workers in Kenyan and other SSA context. We feel our hybrid model engages with them in evidence based training. One of our key concerns is to deepen the psychosocial support that is offered via this computer-human interface providing simple but stepped care design type messages or direct interface as need arises

or caregiver requires. Being in a consecrated dialogue with psychotherapists and mental health specialists based in Kenya and US, we have been deliberating on recently launched low intensity manualized treatments offered by WHO (WHO 2015) as a way of borrowing models and therapeutic stances to bring to the mobile portal. We are very conscious of the fact that mhealth faces a deep criticism from those who argue how it removes the relational component of human exchange. We have been very focused on a hybrid computer-human exchange where a direct health worker-caregiver contact could be made when there is a felt need but more importantly the SMS are embedded in the everyday concerns of the caregivers (Vassilev et al 2015) and are offered in a supervised, well thought out CCD augmented with parenting and problem solving strategies promoted by some of WHO initiatives (WHO, 2015; WHO mhGAP, 2016). These planned inquiries would provide critical insight into behavioral change models that speak to families in resource constrained contexts as we introduce positive motivational messages, support, information about caregiving and problem solving strategies. As we progress with in this inquiry our concern is to take Ministries of Health and Education in Kenya more actively on board to understand if our implementation framework, community partnership and empowerment strategy and behavior change via mobile ECD dissemination matches their vision and evolve forays to develop cross-cutting understandings.

## **Discussion**

A computer-human SMS platform is a compelling delivery mechanism that could plausibly address scientific, social and affordability issues noted in other ECD delivery mechanisms in a coordinated manner. Automated messaging allows for comprehensive, time- and age-appropriate content whilst the SMS dialogue allows frequent counseling and social support at flexible times, and during critical windows and for high-risk individuals. SMS-based counseling reduces costs and time-burdens, by eliminating the need for transit to individual homes. Documented content of the counseling dialogue offers a unique opportunity for supervision and monitoring and evaluation, and can be used to refine future approaches. This platform could have multiple beneficiaries including: providing counseling and social support to individual mothers and their male partners or secondary caregivers to improve infant feeding and neurodevelopment. It may also empower community health workers by providing them with better access to technology, reducing their travel times, and providing mechanisms for ongoing training in real time. The shared sense of responsibility and network of people involved in this project bring diversity, complexity but also problem solving and continued focus towards uplifting overburdened families and health workers through this innovative portal. In summary, we have invested in our partnerships, common resources, and needs of caregivers, families and health workers by assisting in the reverse the trend of developmental disadvantage in early childhood Kenya.

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# Evaluation of Common Bean Production Systems and Fertilizer use in Nandi South

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## Abstract

High fertilizer cost and increased concern for ecological sustainability have led to improved interest on green manure and organic fertilizer. The study evaluated common bean production systems and organic fertilizer use by farmers in Nandi South. A semi structured questionnaire was administered to individual farmers in the form of interviews and the data was analyzed through descriptive statistics, frequency counts and percentages. Results showed that majority of the farmers were women with a mean age of 51.6 years. Many farmers 59% cultivated improved bean varieties sourced from their own farms and applied fertilizers albeit different quantities. The results further indicated that 67% of farmers in Koibem and 57% in Kapkerer applied green manure as a soil amendment. Addition of green manure to soils helps in improving soil conditions and increasing crop yields in low soil fertility areas. Green manure use as soil amendments is an ecologically sustainable way of increasing yield.

**Relevance to innovation.** Many modern agricultural practices have unintended negative consequences and therefore there is growing concern about sustainable and better agricultural systems. It is therefore time to assess the importance and future role that soil improving legumes may play in agricultural system. Application of lablab legume species as green manure is an important practice for sustainable agriculture production as the crops fix nitrogen and has deep and extensive root system that allows for nutrients extraction and recycling. Green manure has favourable N to P ratios and has predictable N activity hence its application will increase yield.

**Key Words.** Chemical fertilizers, Common beans, green manure, smallholder farmers.

## **Introduction**

Common bean is an important source of dietary protein and calories, iron and supplementary amino acids (Mwangi et al., 2008). It is the most widely grown legume in Kenya and it is second to maize in importance as staple food. The crop is grown for its green leaves, green pods, and immature or dry seeds (Mwangi et al., 2008). In Kenya, beans are largely grown by small scale farmers with fewer than five acres and mostly intercropped with maize. They play an essential role in the sustainable livelihoods of smallholder farmers and their families by providing both food security and income generation (Spence, 2003).

The crop, however, is grown under challenging conditions, including marginal lands with infertile soils, prone to drought, pests, and diseases. Majority of the farmers do not have access to quality seeds and when they succeed in producing surpluses, they have difficulty accessing markets, and are therefore unable to extract sufficient profits from their labour. Drought and low soil fertility are primary constraints to crop production throughout the third world countries, and this is particularly true of common bean, which in poor countries is typically a smallholder crop grown in marginal environments with few inputs. Fertilizer use is negligible in many third world countries, especially in sub-Saharan Africa, which commonly have the poorest soils (Lynch et al., 2009). Incorporating green manure to the soil increases soil carbon, available nitrogen, concentration of nutrients near the soil in available form, and reduces N losses through leaching and soil erosion and organic matter (Talgre et al., 2009). Increases in soil organic matter due to green manure improves soil physical and biological properties by increasing the distribution and stability of the soil aggregates (Sultani et al., 2007). The use of organic fertilizers to replenish soil and reduce soil pollution which mostly occurs due to continuous use of chemical fertilizers is growing interest worldwide (Mamzing et al., 2016). Inorganic fertilizers are expensive and cannot be afforded by majority of small scale farmers. Organic manures are fertilizers made from cattle dung, urban and rural composts, crop residues and green manure.

The use of legume species as green manure is an important practice for sustainable agriculture production as the crops fix nitrogen and has deep and extensive root system (Carvalho et al., 2015) that allows for nutrients extraction and recycling. Several legume species used as green manure have different properties which affect soil properties differently. This study was therefore carried out to assess and evaluate the common bean production systems and the uptake level of green manure adoption amongst the small scale farmers.

## **Materials and methods**

### **Selection and description of study area**

The study was conducted in the Southern part of Nandi County, that covers Koibem (high fertility) and Kapkerer (low fertility). This area was selected because of its importance in Common beans production, due to its favourable environmental conditions. Furthermore, most of the dissemination efforts of improved Common beans varieties have focused in the area. Nandi County is in the North of Rift valley occupying an area of 2,884km<sup>2</sup>. Nandi

County is bound by the Equator to the south and extends to the North to latitude 0°34'N. The Western boundary spreads to Longitude 34°45'E, while the East boundary reaches Longitude 35°25'E at an altitude of 1850-2040m above sea level (Nyberg et al., 2012). The climate is marked by two contrasting seasons; the long rain season which normally starts from March to August and the short rain season which lasts from September to December. The average annual precipitation is 1200mm to 2000mm with mean yearly temperature ranging from 18-25°C and the soils are characterized by well drained clay loamy soils (FAO-UNESCO, 1997). The major crops grown are maize, beans, tea and also livestock farming.

### **Sampling technique and data collection**

Data used in the study was obtained primarily from a survey that targeted project participating households. A semi structured questionnaire was administered to individual farmers in the form of interviews. The interviews covered the main common bean varieties grown, cropping systems, source of seed, and the fertilizer types applied. Additional data were collected on green manure utilization, time of incorporation and time after planting and yields. To ensure effective coverage of the study area, farmers in the project were systematically sampled in the two regions (Kapkerer and Koibem) by selecting the third farmer in a transect line. A total of 51 farmers were considered for the interview. The formula described by Barlett et al., (2001) was used to determine the number of farmers surveyed.

### **Data analysis**

Quantitative data was processed, given a code and analyzed using Statistical Packages for the Social Sciences (S.P.S.S version 20). The results were presented by use of descriptive statistics, namely percentages and frequencies.

## **Results**

### **Household socio-economic characteristics of the farmers**

Results illustrate that most of the respondents were female (67%) across the two sites and the proportion of females was also higher in Koibem (76%) and Kapkerer (65%) (Table 1). The statistics also confirms that the proportion of male headed households was greater at 54% than that of female headed. Male headed household still formed the majority in Koibem (67%) and Kapkerer (56%). On average the farmers interviewed were 51.6 years of age, this ranged from 28 - 76 years (Table 1). The farmers in Koibem were slightly older (54.3 years) than those in Kapkerer (48.8 years). In terms of education, the results illustrates that farmers attained an average of eight years of education/schooling which is equivalent to attaining Kenya Certificate of Primary Education (KCPE). The farmers in Kapkerer had significantly higher means score on education (9 years) than those in Koibem (7 years)

**Table 1. Socio-economic characteristics of bean farmers in Nandi South**

Characteristics	Pooled Sample			Koibem			Kapkerer		
	n	Mean	SD	n	Mean	SD	n	Mean	SD
Age of farmer (years)	51.0	51.6	2.8	18.0	54.3	9.8	23.0	48.8	12.9
Education level (Schooling years)	51.0	8.0	1.0	18.0	7.0	1.5	23.0	9.0	2.5
Total land size (acres)	51.0	4.5	0.4	18.0	4.9	3.0	23.0	4.1	2.5
Total land under beans (acres)	51.0	1.0	0.4	18.0	1.2	1.0	23.0	0.7	0.47
Duration of land use	51.0	23.7	5.0	18.0	20.1	8.9	23.0	27.2	6.1

*Source: Field survey data, SD is Standard Deviation*

### Sources of bean seeds and farmer preferences for bean varieties

Farmers obtained their seeds for planting from various sources (Figure 1). Majority of farmers in Koibem (94%) and Kapkerer (61%) used their own seeds as planting material while other farmers obtained the seeds from their neighbours (Koibem 50% and Kapkerer 9%). The results showed that around 39% of the farmers in Kapkerer and 28% of the farmers in Koibem obtained their planting seeds from the market. However, no farmer from both Koibem and Kapkerer obtained seeds from the agro-shops. Majority (86%) of the farmers grew both local and improved bean varieties (Table 2). Majority of the farmers had adopted at least one of the improved varieties that were being promoted by the project while Nyayo (45% Koibem) was the most popular local variety grown in Nandi South. The same variety was the most popular local variety in Kapkerer (26%). KK8 was the most preferred improved variety in Koibem (67%) and in Kapkerer (52%) other improved varieties grown include KK15, Rosecoco.

Farmers preferred to grow improved bean varieties because of high yields, palatability, cooking time, and disease tolerance compared to the local cultivars. Variety KK8 and KK15 were the most preferred mainly because of their high yielding potential, and disease tolerance. Farmers interviewed owned on average about 4.5 acres out of which 1 acre was allocated to the production of beans (Table 1). The local varieties Nyayo, Alulu and Punda were mainly preferred by farmers due to their high yielding abilities and resistance to common bean diseases.

### Fertilizer use by farmers

On the basis of the analyzed data inquiring about fertilizer application by the farmers in Nandi South, inorganic fertilizer and green manure were the main components used. Results of the survey show that all the farmers interviewed in the two sites applied inorganic fertilizer albeit in different quantities (Figure 3). All farmers in Koibem at least applied green manure from different sources, however, only 61% of the farmers in Kapkerer adopted the technology of green manuring. The average rate of fertilizer application was 30kg per ha against the recommendation of 120kg/ha as outlined by the manufacturer.

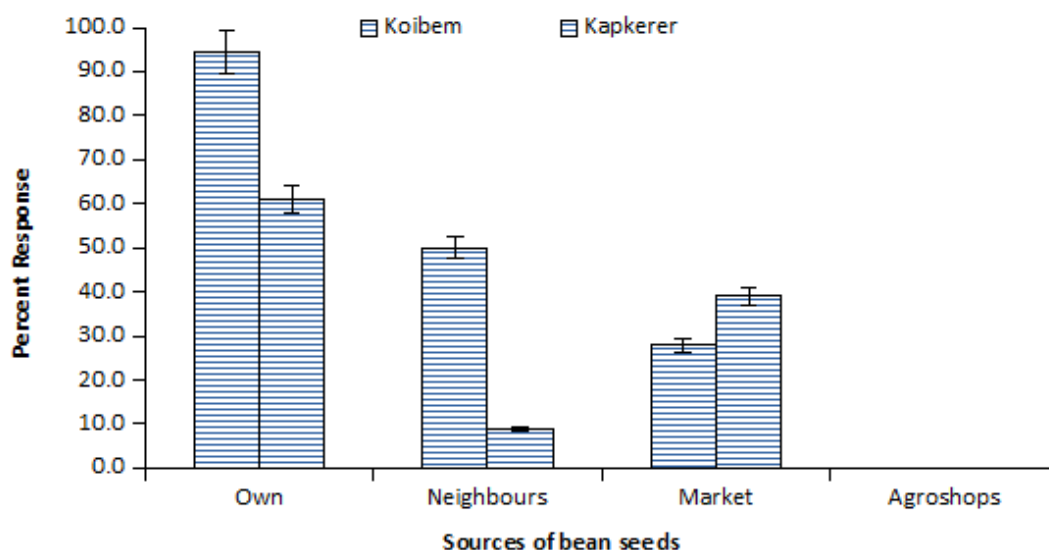


Figure 1: Sources of beans seeds to farmers in Nandi South

Table 2: Main local and improved bean varieties planted by farmers in Nandi South, Kenya

Proportion (%) of farmers growing local cultivars				Proportion (%) of farmers growing improved variety			
Local variety	Total (N=51)	Koibem (N=18)	Kapkere (N=23)	Improved variety	Total (N=51)	Koibem (N=18)	Kapkere (N=23)
Alulu	13.7	5.6	21.7	KK8	59.5	66.7	52.2
Punda	6.5	0.0	13.0	KK15	47.4	55.6	39.1
Nyayo	35.3	44.5	26.1	Rosecoco	33.1	44.5	21.7

Source: Field survey data. Most percentages more than 100 due to multiple responses

### Major crops grown by the farmers

Commonly grown crops by the farmers in the study area were maize, tea, sweet potatoes, cassava, groundnuts (Table 3). Majority of the respondents grow the following food crops: maize (100%), bananas (35%), sweet potatoes (27%) and groundnuts (23%). About 23% of the interviewed farmers grow tea. Other crops grown include soybean, cassava, tomatoes, and sorghum.

### Green manure use and application methods

All the respondents from both sites applied inorganic fertilizer (Figure 3). All the farmers in Koibem agreed to have applied green manure. However, only 61% of the respondents in Kapkerer applied organic fertilizer. Farmers used different way of incorporating green manure in the soil (Figure 4). Majority of the farmers both in Koibem (67%) and

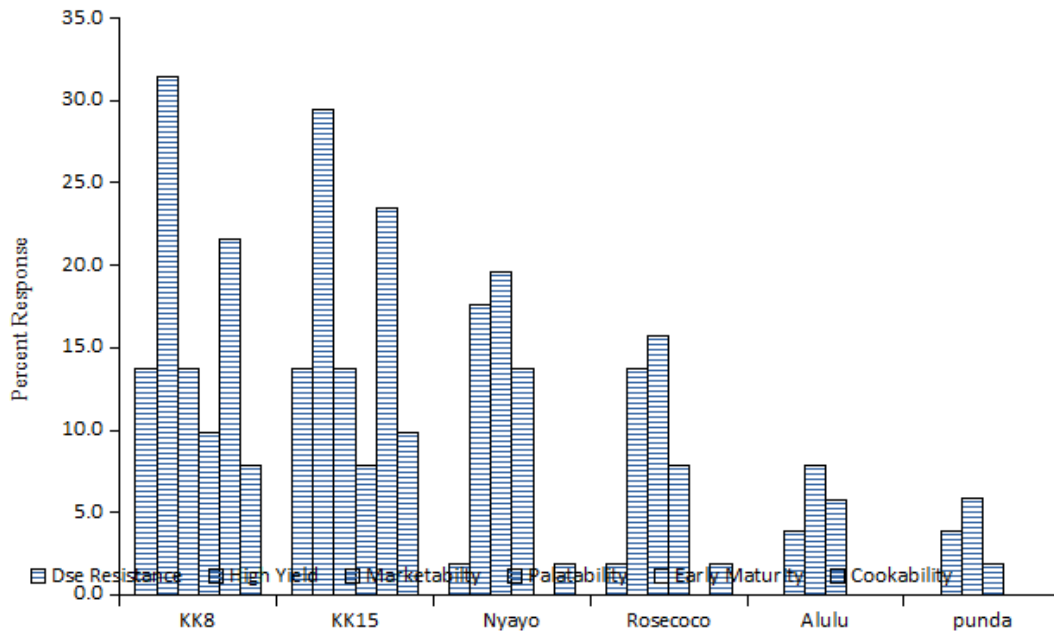
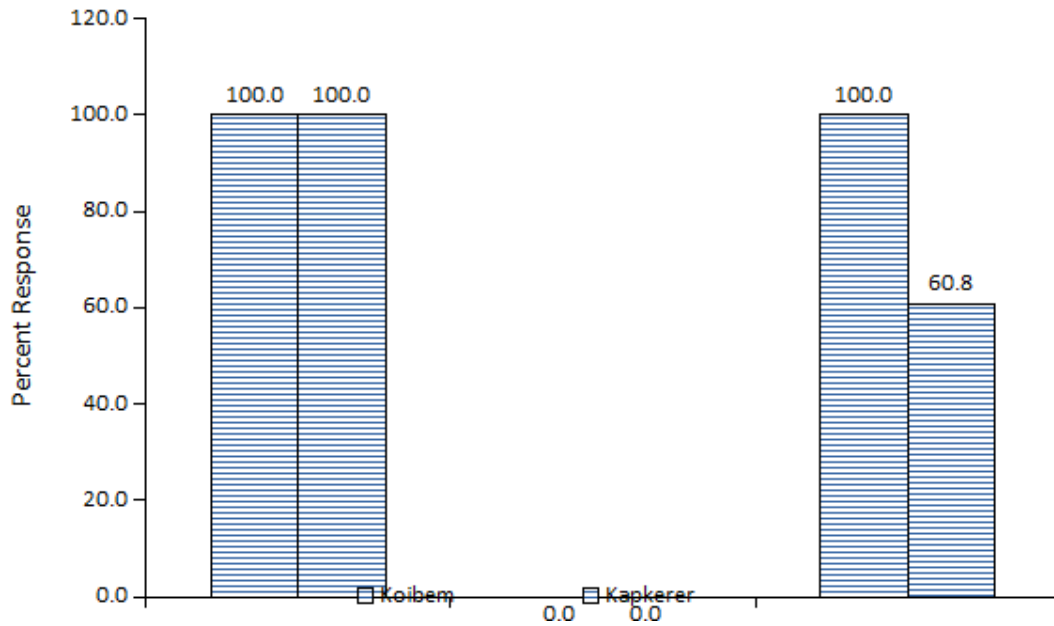


Figure 2. Main attributes influencing farmers' preferences/choice of selected common bean varieties in Nandi South

Table 3: Distribution of respondents based on type of crop grown

Crop	Frequency	Percentage (%)
Maize	51.0	100.0
Bananas	18.0	35.3
sweet potatoes	14.0	27.5
Tea	12.0	23.5
Groundnuts	12.0	23.5
Soybean	6.0	11.8
Cassava	6.0	11.8
Tomatoes	4.0	7.8
Sorghum	3.0	5.9

*Most percentages more than 100 due to multiple responses*



**Figure 3. Fertilizer use among farmers in Kapkerer and Koibem, Nandi County**

Kapkerer (57%) incorporated green manure by evenly spreading the residues over the farm and plough in. Other farmers in Koibem (28%) and Kapkerer (17%) ploughed in the remaining crop residue while still standing while others in Koibem (5%) and Kapkerer (26%) left the residues as mulch on the soil then ploughed later in the soil

### **Usage of green manure by the farmers**

All the farmers who applied green manure used different application methods and they did this when the green manure crop had matured (Figure 4). Majority of the farmers in Koibem (66%) and Kapkerer (56%) evenly distributed green manure residues before incorporation. Other farmers in Koibem (27%) and Kapkerer (17%) incorporated the green manure while still standing in the field. A few other farmers left the residues in the field as mulch Majority of the farmers interviewed in Kapkerer (52%) and Koibem (44%) do planting two weeks after incorporation of green manure in the soil while others (33%) in Koibem and (35%) in Kapkerer planted three weeks after green manure incorporation (Figure 5). A few others from the two sites planted after four weeks of incorporation. However, it is interesting to note that no farmer planted immediately after incorporating green manure.

### **Benefits of green manure**

Majority of the farmers in Koibem clearly understands the benefits associated with green manure to crop production (Figure 6). Majority of the farmers in Koibem indicated that incorporation of green manure in the soil improved soil fertility (72%), and therefore

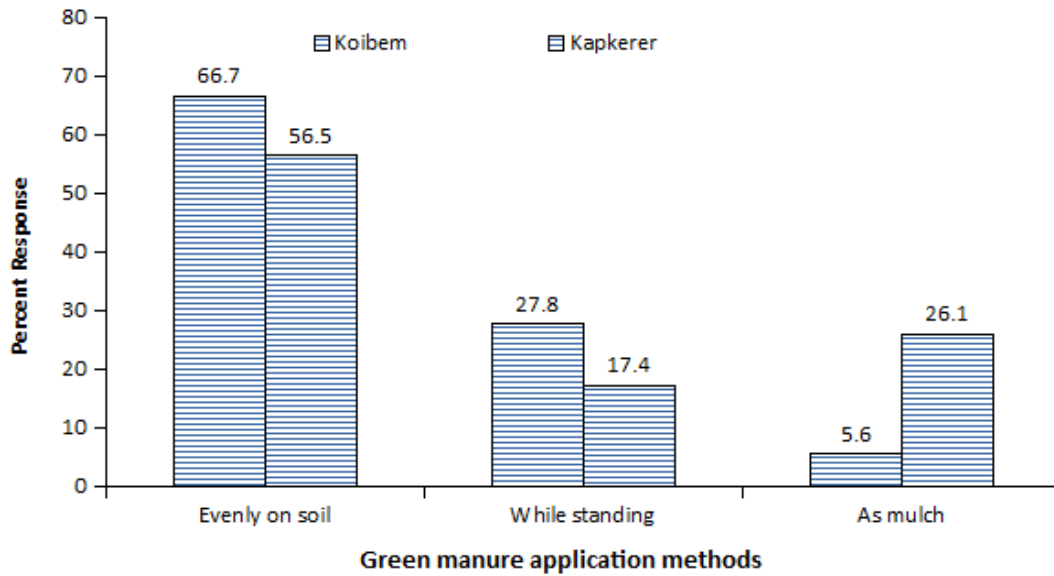


Figure 4: Methods of green manure application

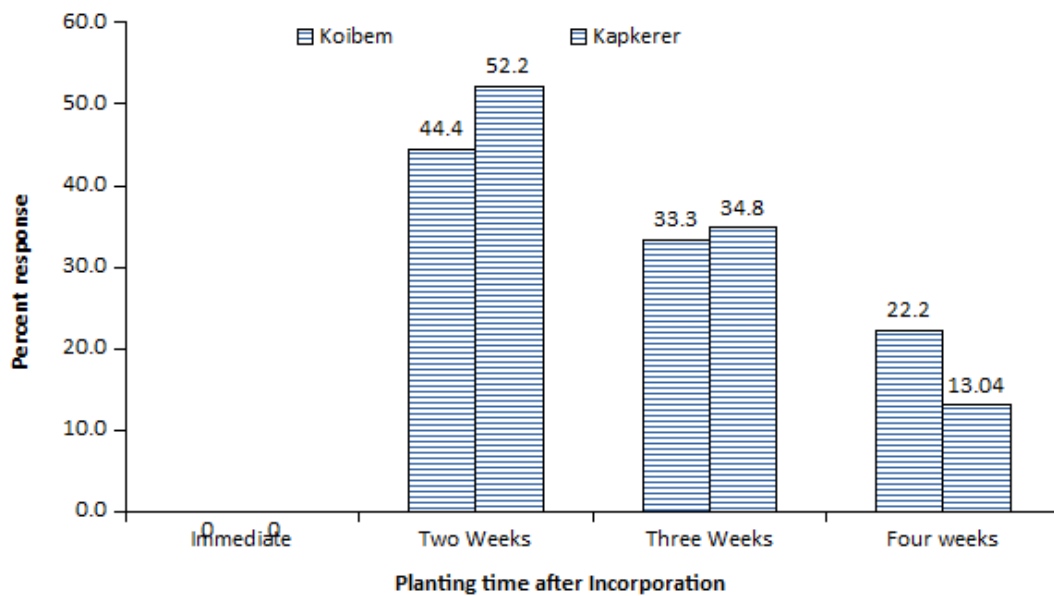


Figure 5: Planting time after green manure incorporation



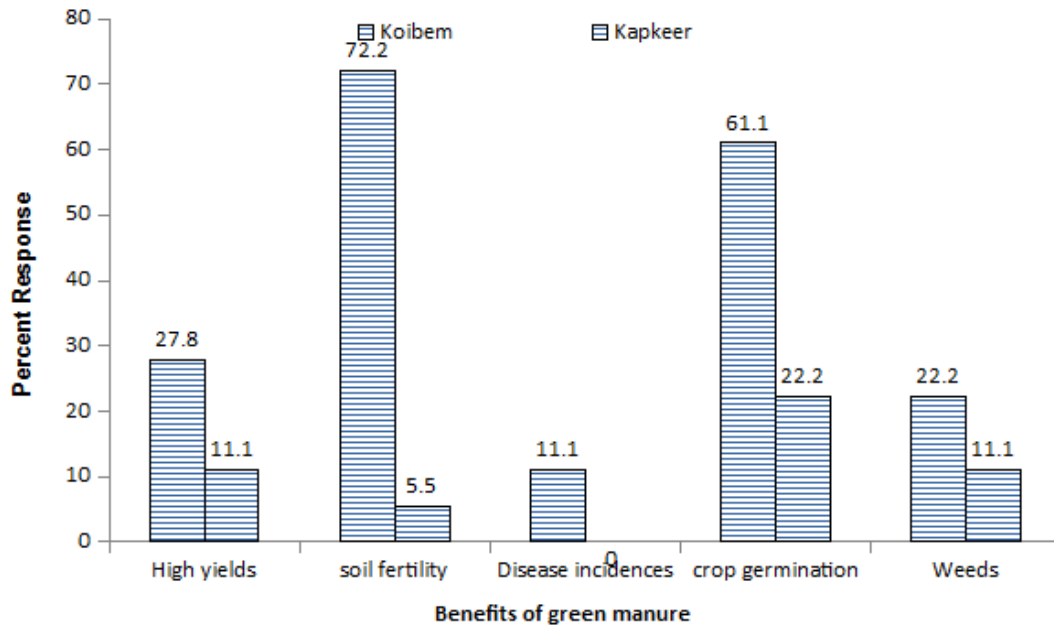


Figure 6: Benefits of green manure

enhanced crop germination (61%). Farmers in Koibem also listed high yields, reduced disease incidences and suppression of weeds as some of other benefits of incorporating green manure. However, the same cannot be reported for Kapkerer as most farmers do not recognize benefits associated with green manure application. Only 22% of the respondents reported that green manure improved crop germination.

When the farmers were asked how they planted their crops after green manure incorporation, all the farmers from Koibem reported that they planted their crop evenly over the incorporated green manure. However, only 57% of the interviewed farmers in Kapkerer evenly planted their crops after green manure application. Others farmers from Kapkerer planted crops on top of green manure applied.

## Discussion

The high proportion of farmers growing improved common bean varieties infers that the Multipurpose Legume Project (MLP) has played a major role in enabling farmers to access improved bean varieties with attributes that farmers have been longing for. The observed decline in number of farmers growing local cultivars is a clear indication that the newly introduced improved common bean varieties were replacing some of the local varieties in the area where the project covered. This, however, has a negative effect as it will lead in erosion of genetic diversity of beans (Sanya et al., 2015).

Attributes like disease resistance, high yields, and marketability and consumer consumption preferences directed farmers in choosing which variety of beans to plant. Majority of farmers based their choice of variety on high yields and early maturity. How-

ever, Sanya et al (2015) working on uptake of bean root rot resistant varieties reported that the choice and preferences of a variety could be house specific or location specific. The influence of yields, disease tolerance and resistance and varietal marketability are in consistent with other studies for improved varieties (Mugisha-Mutetika, 1997; Nasirumbi, 2008). High yields play a significant role in adoption of improved variety as it results in satisfactory consumption and surplus being sold to earn income (Sanya et al., 2015).

Majority of the farmers grew crops like maize, tea, sweet potatoes. These crops were identified by asking the farmers to indicate which of the crops they grow a part from beans. These crops were planted on land sections of individual land, family or inherited land as they are the major sources of income for the farmers. Other crops like maize were used or intercropping as majority of the farmers practised intercropping type of farming.

The farmers' main source of seed is retained seed; majority of the farmers selected the best seed after harvest and treated them traditionally for preparation to planting (Ngayu-Wanjau, 2013). These varieties, however, are of superior qualities compared to the local isolates. Other farmers obtained their seed from their neighbours and from the market. A number of local varieties planted significantly reduced since the introduction of improved bean varieties in the project area. Similarly the yield harvestable per unit area of beans improved. The increase in total yield harvested and the reduction in the number of local bean varieties planted can be attributed to better yields and disease resistance abilities of the improved bean varieties. The same has been reported by (Sanya et al., 2015). The results that farmers were saving their own seeds for planting and applying inorganic fertilizers at rates that are not recommended due to high costs and lack of reliable source imply that input costs and availability influenced farmers' choice of variety and fertilizer to apply. Poor soil fertility is one of the major causes of low agricultural productivity in Sub Saharan Africa (Williams 1999). Organic manure increases yield, enhances soil organic matter, raises soil pH and improves nutrient availability and exchange and water holding capacity (Williams 1999). However, despite the beneficial effects of organic manure in crop production and soil fertility management, organic manure is not frequently applied by most farmers (Oyesola et al., 2011).

Sources of information on green manure use are the channels through which farmers obtain information for farming and utilization of green manure as a soil amendment. The information sources were evaluated by asking the individual farmers where they obtained information on green manure use. All the farmers (100%) accessed information on green manure use through the KALRO staff in the MLP project; however, not all the farmers adopted the technology. This shows that the project had some positive outcome and encouraged farmers on the benefits of green manure on soil and crop production in general. The level of adoption of green manure usage amongst the interviewed farmers was average. This contradicts findings by Emu et al., (2011) who found that the extent of adoption by small scale farmers was very low and this required a more extensive approach by the extension agents on this group of farmers. Some of the factors influencing decisions by farmers to adopt organic manure usage may include farming experience, high cost of inorganic fertilizers, level of education and estimated yield from organic manure in the short term.

Majority of the respondents planted crops two to three weeks after incorporation. It would appear that the farmers understood the effects of planting immediately after

incorporation. This they did to avoid the deleterious effects associated with in farms with undecomposed plant residues. Some of the deleterious effects associated with undecomposed plant residues include release of phytotoxic compound products, enhancement of pathogenic organisms and increased competition (Wall, 1984). The effect of plant residues on seedling emergence can be influenced by maturity of the tissues and their carbon to nitrogen ratios and the time elapsed between incorporation and planting. Immediately after incorporation there is usually an explosion of microbial activity that includes germination of propagules of pathogenic fungi that may invade susceptible hosts and this may results in poor crop establishment.

Improved bean varieties gradually replaced local bean cultivars as farmers increasingly appreciated and planted the resistant varieties. The main varieties adopted were KK8, KK15 and Rosecoco. High yields, diseases resistant and palatability were the attributes influencing farmers choice of these varieties. The farmers should be encouraged to consider application of green manures as an alternative to the expensive inorganic fertilizers. This, however, calls for the people involved to train the farmers on the benefits of green manure technology. When applying these green manures farmers should know that a fallow period of several weeks between incorporation time and planting may allow for the drop in pathogen populations and reduction of other deleterious effects associated with decomposing green manure. It is therefore important that farmers allow for time between incorporation and planting to ensure decomposition. To sustain this technology, access to information and extension services are to be improved to increase adoption and use of green manures.

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