A Systems Dynamics Model for Mobile Industry Governance in the Context of the Kenyan Vision 2030

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ABSTRACT

This article describes how Kenya has emerged in recent times as one of the fastest-growing telecom markets in the world. This article presents a system dynamics-integrated model of the Kenyan telecommunication sector—mobile telephony—that has been developed and calibrated to demonstrate the various interactions among system variables and the resultant impact on economic growth through simulations. The simulation results prove that the regulator, the Communications Authority of Kenya, should be the key entity to be governed. This modeling process started by delineating the mobile industry’s system boundary. The interactions amongst the entities were then described. Based on a historical data analysis and the system archetypes identified, a system dynamics (SD) model was developed. The research tested the results of the model in a combination of scenarios, apart from several underlying feedback effects, it was found that mobile telephony and growth in gross domestic product (GDP) had a strong positive correlation.

KEYWORDS

Governance, Mobile Industry, Modeling, Systems Dynamics

INTRODUCTION

This study investigates mobile phone usage output on economic growth in Kenya. Inconsistent economic growth based on mobile service activity is a big concern in the developing as well as in the developed world. The econometric approach follows previous work by (Adrianavo and Kpodar, 2011) and (Lee et al., 2009) on the impact of mobile penetration on GDP per capita growth. In Kenya, mobile telecommunication industry has witnessed a tremendous growth over the last few years, by June 2014 the total number of mobile subscriptions was recorded as 37.8 million up from 36.1 million (CAK, 2015). However, there is a wide variation in mobile diffusion as well as GDP growth across various counties in Kenya, raising questions of socio-economic disparities and how technology diffusion may help in the convergence of growth process among various counties. (Mindila et al., 2014), presents a systematic strategy of employing Information and Communication Technologies (ICTs) as interventions in the structural underpinnings of knowledge identification and management and models them within the system dynamic model. Empirical studies have found several factors such as per capita income, income inequality, population density, the age profile of the population, competition and regulatory structure to have a positive impact on mobile penetration (Yamakawa et al., 2013; Chakravarty, 2007). The relation between inequality and mobile penetration has been found to

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be mixed. In some studies, mobile penetration, was found to be negatively related to income inequality; whereas, it is positively related to inequality in the early stages of diffusion (Roeller & Waverman, 2001; Hyttenni & Toivanen, 2011). In the developing country context, mobile phones serve dual purposes: one, as a consumption good for the rich and two, as a production good for the poor. Case studies from the Africa and Asia have shown the usefulness of mobiles as a production good (Jensen et al., 2007; Aker et al., 2008; Muto et al., 2008). For this reason, income inequality may influence the spread of mobile penetration in the early stages. Embracing the digital revolution requires good ICT governance. As highlighted by (Nair et al., 2005), for ICT to contribute to economic growth, a conducive legislative environment should be in place to support communication, commerce and trade in the digital medium. Although the impact of economic and demographic factors on mobile penetration has been established, there is not much clarity on the relationship between mobile phone penetration, economic growth and the extent to which this leads to convergence of growth process. The mobile industry of Kenya is, therefore, an exemplifying case for the phenomenon.

Schumpeter was the first to conceptualize the way innovation affects growth, providing the solid ground to hypothesize that ICTs have a positive impact on growth. (Sanjay & Dayalbagh, 2013) show the utility of systems approach by extending the traditional innovation models and incorporating and integrating into them selective critical structural variables to map their interaction and explain the inherent dynamism. Solow also affirmed that technological development can explain growth trends. Indeed, several studies have explained the way that ICTs influence the flow of growth, providing empirical data that agree to the significant positive impact of ICTs (Papaioannou & Dimelis, 2007). According to (Heeks, 2009) there are 3 periods of ICT4D

Research on the developmental potential and impact of information and communication technology (ICT) is a multidisciplinary field. Contributing disciplines include information systems (IS) (Walsham et al., 2007), human-computer interaction (HCI) (Dearden, 2008), communication studies (Mansell, 2002), and to a lesser extent, development studies (Wade, 2002). Invariably, ICT and development (ICTD) studies are based on the premise that ICT can contribute to the improvement of socio economic conditions in developing countries (Mann, 2004; Sahay, 2001; Walsham et al., 2007). They all aspire to the realization of perceptions of desirable world orders, such as Sen’s theory of capabilities (Kleine, 2009; Madon, 2004; Zheng, 2009) or the United Nations’ Millennium Goal vision of eradicating poverty (Gihooly, 2005). Nevertheless, more often than not, the development potential of ICT is taken for granted, an implicit assumption for particular research objectives, which range from the mobile services provision of technology applications suitable for developing countries to the facilitation of the spread of technologies (Kraemer et al., 2009) to understanding the institutional changes required for a developing community to benefit from ICT’s developmental potential (Ma et al., 2005). But even if not explicitly acknowledged, every ICTD study makes specific assumptions about the way IT innovation happens in the context of developing countries, and about the meaning and the nature of the process of “development” toward which such innovation is intended to contribute.

In summary, the issue of ICT and economic growth has received much attention with respect to the developed countries as opposed to the developing countries. (John et al., 2006, p. 51), highlighted that ICT enhances economic growth of developing countries by way of:

1. Providing cheaper, quality, and empowered communication to marginalized communities
2. Reduce inequalities in terms of access to education, training and employment
3. Provision of easier access to information and wider market reach to firms (by way of cost reduction)
4. Reduction in government bureaucracy via the electronic government service system
5. Fostering closer collaboration and interaction between various stakeholders in a country.
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