

Innovation and Development: A Framework “Unmasking” The Role of Institutional Development

ABUBAKARI Sadiq Mohammed^{1*} YANG Hui¹ KARIMU Abdul-Rashid² HIKIMA Adam³
 1.School of Public Affairs, University of Science and Technology of China, 96 Jinzhai Road, 230026, Hefei City, Anhui, China
 2.Computer Science Department, Business Senior High School, Tamale Northern Region, Ghana
 3.Tamale Technical University, Tamale, Northern Region, Ghana

Abstract

In contemporary times, one hardly finds progress without the element of innovation. Individuals such as Bill Gates, Warren Buffet, and Mark Zuckerberg just to mention a few are a subject of extolment because they distinguished themselves from the norms of society by adding value to what is already there or inventing an entirely new product. This presupposes that development and innovation are inseparable. The purpose of this paper is to provide a framework on the ostensible relationship between innovation and national development taking into account the role of institutional quality. The paper explores the ingredients for a smooth takeoff of innovation drive through science and technology in developing economies. The paper is in attempt to address challenges faced by developing economies such as the ones in sub-Saharan Africa. A rigorous literature-based analysis was employed by considering concepts from innovation and development. A synthesis of the various concepts and constructs leads to the development of a three-pronged conceptual framework. The findings indicate that it takes the effort of a well-developed institutional framework to evolve innovation and have it applied for the benefit of society. The paper in its essence emphasizes that institutions are the facilitators of the innovation drive and that it takes an efficient and vibrant institutional setup to actualized this benefit. The framework will enrich the discourse on innovation and development by contributing to theory, research and practice in the science, technology and innovation (STI) agenda. The paper concludes by pointing out that, the environment plays an important role for institutions to function. The pro-activeness of institutions is contingent on the environment necessary for them to thrive. That is, public funding of innovation drive cannot be decouple from institutional framework and that is what developing economies must realize and embrace to bring about the structural change so desired.

Keywords: Innovation; Institutional Quality, Science, Technology and Innovation (STI), Development; Entrepreneurship; Developing Economies.

1. Introduction

In contemporary times, one hardly finds progress without the element of innovation. Individuals such as Bill Gates, Warren Buffet, and Mark Zuckerberg just to mention a few are a subject of extolment because they distinguished themselves from the norms of society by adding value to what is already there or inventing an entirely new product. This presupposes that development and innovation are inseparable. At the macro level, emerging economies such as the ones in the Asian Tigers, Japan and China were borne out of innovation. Yet innovation which is the application of knowledge is a contingent effect of institutional development and the environment. Institutions are complex social systems. According to de la Mothe (2004) innovation arises out of complex combination of research, technology, and managerial acumen within the context of social demand and individual creativity.

Having said that, innovation drive is sparse in some region whiles in others, it is the reason for their development. Sub-Saharan Africa is way behind other regions because its people, despite their historical credentials in science, have not been able to progress owing to dysfunctional institutional setups. The more the western and other emerging economies in the world was able to invent and innovate in the last 300 years, the more "civilized" they became. According to Moghalu (2014), most developing economies in Africa in comparison, have remained closer to nature and was dominated by natural phenomena, the more "primitive" and backward the continent seemed. Similarly, the World Bank reported that the amount of scientific and technical journal articles in Africa was less than 1% (approximately 0.64%). When a comparative analysis is done in relation to other regions where innovation is around 36.84%, 24.17%, 2.72% and 3.04% for Europe, East Asia, South Asia and Latin America respectively, then it goes to confirm the assertions being made about the region (World Bank 2009).

This paper therefore seeks to propose a conceptual framework on the relationship between innovation and development. The paper explores the ingredients for a smooth takeoff of innovation drive through science and technology in developing economies. A rigorous literature-based analysis is employed by considering concepts from innovation and development. A synthesis of the various concepts and constructs leads to the development of a three-pronged conceptual framework.

This is a conceptual paper, therefore data was gathered from secondary sources that included journal article, books, webpages, reports, conference proceedings and working papers. The reviews were subjected to the intuitive judgment of the author leading to this refined scholarly output.

As a consequence, the rest of the paper is organized as follows. Section two takes a look at the broad concepts of development and innovation. In between, the paper unmasks the role of institutional development on innovation and development respectively with emphasis on the theories of development. Section three is the conceptual framework with the corresponding logical linkages. Subsequent sections discuss the subject further and makes recommendation. The paper concludes in section five.

2. The Concepts of Development, Institutions and Innovation

Development as a concept is broad and is subjectively defined depending from the angle it is being viewed. This is due to diverse perception held by both development experts and researchers. In dilating on this subject, the World Bank in one of its seminar contributions put forward a simple question to demonstrate how contentious the subject can be – “are you sure you know what “development” really means with respect to different countries?” and can you determine which countries are more developed and which are less? (World Bank 2004). The relevance of these questions can be inferred from priorities countries set with respect to what constitute their development policies. That notwithstanding, it is quite easy to say which country is richer, and which are poor using contemporary indicators. Yet wealth indicators which reflects resource endowments to society gives no clue on how it is allocated. It is for this reason Myrdal authoritatively defined development as “the movement upward of the entire social system” (Myrdal 1974). Thus Myrdal elucidates that the tenets of development enclose besides the so-called economic factors, all noneconomic factors.

Myrdal’s definition draws important implications: (1) development as a concept is broad (2) economic well-being is narrow and cannot be used to represent the whole. In the same vein, it should not be misconstrued as an upward movement in just noneconomic factors, but rather a collective movement in all spheres of the human endeavor. In reality, there is disagreement in the application of the term in contemporary researches. This misunderstanding has indeed given rise to differing perspectives with mainstream research equating development to economic growth while opponents have called for a broader perspective to the concept. In this research, the interest is on how the application of knowledge can better the lives of people. The research briefly profiles the two ways development is conceptualized and measured.

2.1. Economic Growth as a Criterion of Development

It is a common phenomenon for economists to equate development to economic growth. That is growth in output is indicated by standard measures like Gross National Income (GNI) or Gross Domestic Product (GDP) often expressed on a per capita basis (Ersson & Lane, 1996). According to Cypher and Dietz (2009), GNI is the “total value of all income accruing to residents of a country, regardless of sources of that income” - that is, irrespective of whether such income is derived from sources within or outside the country. GDP on the other hand is the total value of all income (final output) created within the borders of a country, regardless of whether the ultimate recipient of that income resides within or outside the country. Economists often use a nation’s per capita income as a measure for evaluating the overall level of national development and welfare including the progress a nation makes over time (Cypher & Dietz, 2009). Yet it is plagued with so many challenges. Indeed proponents of this strand have admitted GDP isn’t the ultimate, and have often defended their approach with the argument that, economic growth should be seen as a means and not an end in itself (World Bank 2004). Thus its main purpose is to serve as launch-pad to an all-inclusive human centered well-being.

However, both GNI and GDP fail to include some new production and income that adds to the level of well-being of individuals, while at the same time they count some production as income that does not contribute to human welfare. For instance, Cypher and Dietz (2009) argued that output derived from the labor of women and children including value of home production are omitted from the traditional GNI or GDP estimates. Yet these productive activities contribute to well-being and to the social reproduction of the families by putting food on the table.

In addition, not only is GDP not a measure of (current) social welfare, but it also fails to acknowledge the impact on future welfare, which is central to the ideals of sustainability. Current notion of SD is driven by the fact that human kind should not endeavor to create economic and social prosperity at the expense of future generation (Smits & Hoekstra, 2011). For instance, countries with extensive reserve of natural resources can maintain high level of GDP by depleting them as fast as possible. Though, this undoubtedly has a positive effect on the economic activity for the current generation, but at the detriment of future generation. GDP therefore fails to incorporate the depletion in resources and the critical limits of our planet (Costanza et al., 2009; Smits & Hoekstra, 2011).

Concerns on the “threshold effect” of GDP as a measure of progress also holds that as GDP increases, overall quality of life often increases up to a point. Beyond this point, increases in GDP are offset by the costs

associated with bridging the gap in income inequality, loss of leisure time, and natural capital depletion (Costanza et al., 2009; Talberth et al., 2007). Empirical evidence abounds to suggest that beyond a certain threshold, further increases in material well-being have negative side effects of lowering community cohesion, healthy relationships, knowledge, wisdom, a sense of purpose, connection with nature and other dimension of human happiness. According to Costanza et al. (2009) a strikingly consistent global trend suggests that as material affluences increase, other critical components of psychic income often decline amidst rising social vices like alcoholism, suicide, depression, poor health, crime, divorce and other social pathologies. These shortcomings necessitated for an alternate measure of human well-being.

2.2. Other Measures of Development

As the perspectives from other dimensions are embraced, the entailment of development expand. The focus of development has slightly shifted from quantitative to qualitative measures which is more human-centered. Thus, the attention nowadays is on development that is lasting while providing the need of the present generation without compromising that of the future. The current discourse has been carved to highlight key elements espoused by the then connoisseurs (World Commission on Environment and Development) formal definition on SD as “meeting the needs of the present without compromising the ability of future generations to meet their own needs” (Brundtland Commission, 1987, p. 43).

In the seminal contribution of Sen (2000), which sought to focus on the social dimension of development interprets the phenomenon as “a process of expanding the real freedoms that people enjoy”. Sen further emphasizes that focusing on human freedoms contrasts with the narrower views of development such as identifying development with the growth of gross domestic product, or with the rise in personal income, or with industrialization, or with social modernization. Development requires the removal of major sources of unfreedom: poverty as well as tyranny, poor economic opportunities as well as systematic social deprivation, neglect of public facilities as well as intolerance or over-activity of repressive states (Sen, 2000). These attributes have been corroborated in recent submissions. For instance, according to a report published by UNICEF (2013), SD is defined as having “both inter-generational and intra-generational equity”. The report further posit that SD involves fulfilling collective responsibilities to ensure safer, cleaner, healthier and more inclusive world for both today’s children, and for their children. As a result, sustainable human progress will also be determined by the degree to which the principle of human rights, equality and sustainability are upheld throughout all efforts of development (UNICEF 2013; United Nations 2013b; United Nations 2012).

However, there are challenges in having an appropriate composite indicator that measures sustainability without flaws and which encapsulates the dimensions the concept espouses. A report from a high panel of eminent persons on the post-2015 development agenda corroborated this by further stressing that for twenty years, the international community has aspired to integrate the social, economic and environmental dimensions of sustainability, but no country has yet achieved this (see United Nations, 2013a). The lack of harmonization is partly due to the fact that countries differ in which aspects are relevant to their progress. Cultural, religious and philosophical differences may have contributed in the differing views of what a society should strive for (Smits & Hoekstra, 2011; Talberth, 2008). This study further discusses how development is measured and understood on a sustainable manner taking into account the evolving trend in current discourses.

Progress on the sustainability perspectives have led to a number of proxies. These measures according to Costanza et al. (2009) addresses the concern that GDP emphasizes on quantity which invariably encourages depletion of social and natural capital and other policies that threatens the quality of life for future generation. In general, four main level of categorizations can be identified.

2.2.1 Theories of Economic Development

Theories on economic growth can be divided into a number of major trends, with the emergence of the discipline in the 1950s and 1960s. This phase was dominated by a structuralist approach which emphasized on the role of government in economic growth. However, the failure of government triggered a split into three schools of thought: *the neoclassical approach*, *the reformist approach* and *the dependency approach*. The 1980s saw the dominance of the neoclassical strand, which gave much credence to market mechanism (Cypher & Dietz, 2009; Dowling, & Valenzuela, 2010; Goto, 1997).

There was a paradigm shift in the early 1990s due to the unsuccessful stint of the neoclassical theory in the growth discourse. This shift did not necessarily negate the prevailing trend toward the neoclassical theory, but rather led to the emergence of neo-institutional approach, the new growth approach and the capability approach together with the political economic approach to development (Goto 1997). On the basis of these developments, the study gives consideration to the neoclassical, endogenous and the new institutional theories and the role of the state.

Neoclassical Growth Theory

The neoclassical growth theory assumes that the rate of technological progress is determined by scientific progress that is different and independent of economic forces. Thus, it points out that economists can take the

long run growth rate as given exogenously from outside the economic system. That is to say, the long run growth potential or rate is determined by an outside force, which may be outside the model. Howitt (2008) posits that one of the common predictions of the neoclassical growth model is that, for an economy to converge towards a steady state, rate of growth will greatly depend on the role of technological progress and the growth rate of labor force. The neoclassical strand is in variants with the power-balance theory being a notable subclass of this group. The power-balance theory stresses on international power balance as an important factor in development, including the terms and patterns of trade which tend to keep some countries while other countries get richer (Cypher & Dietz, 2009; Dowling & Valenzuela, 2010)

Endogenous Growth Theory

The endogenous growth theory (also known as “new growth theory” tries to endogenize technical progress) provides a theoretical framework for analyzing long-run economic growth that is determined by forces that are internal to the economic system rather than by forces outside that system (Cypher & Dietz, 2009; Dowling & Valenzuela, 2010; Todaro & Smith, 2003).

Theodore Schultz, an economist at the University of Chicago and a Nobel Prize winner in 1979 is credited for his immense contribution to the theory of human capital. Schultz’s contribution was on investment in human capital through education to enhance agriculture output in the early 1960s. The logical next step was to expand this linkage between better education and improved productivity as a benefit for the economy as a whole. Schulz demonstrated that the yield on human capital in the US economy was much larger than physical capital (new plants and machinery). In 1975, Gary Becker, also a Nobel Prize winner in 1992, waded into the human capital discourse with his contribution. Becker (1975) advocated that human capital is considerably important for economic growth and that investment in human capital was inevitably crucial for sustainable growth or may act as an engine of growth. He explained further that human capital development can take several forms: through formal education and on the job training. Other researchers have corroborated these assertions in seminal papers that emphasized the importance of education in the build up to human capital, which consequentially leads to sustained economic development (see Mankiw et al., 1992; Mincer, 1975).

2.3 Institution – Development Perspectives

2.3.1 The Role of the State and Institutions

This section reviews the role as well as the broad and specific instruments available to the state. This is done in connection with institutional theory within which the function of the state is spelt out. Evans and Reuschmeyer (1985), conceptualizes the state as a set of organizations invested with the authority to make binding decisions for people and organizations located in a particular territory and to implement these decisions, if necessary by force. This definitions syncs very well with what institutional theory postulates.

The new institutional theory in its essence builds on the weaknesses of existing economic theories. As inferred from the explanation of Douglass North (1993) that contrary to many attempts to replace the neoclassical theory, “the new institutional economics builds on, modifies and extends the neoclassical theory to permit it to come to grips and deal with an entire range of issues heretofore beyond its ken”. However, it abandons the suppose assumption of instrumental rationality and retains the fundamental assumption of scarcity. He continues to support this assertion by highlighting on the limitations of the old institutional framework with the point that the instrumental rationality has taking over the course of the world and that institutions are unnecessary together with ideas and ideologies do not matter. Human beings are cognitively limited which imposes a constraint on human interaction in order to structure exchange. In sum, with human cognitive limits, there is yet a breakthrough in cognitive science.

Institutions (local, national, and international) are as is generally known are far more than agencies. Institutions are complex social systems. de la Mothe (2004) agreed that innovation arises out of complex combination of research, technology, and managerial acumen within the context of social demand and individual creativity. Successful institutions are learning organizations, able to adapt to knowledge, to network (Mothe 2004).

With the advent of the so-called “new knowledge” economy, there is a shift of international cultural, political, and economic discussion toward relationships, social contracts, and institutional analysis revolving innovation, technology, and society relationship. Other theories such as the social network theory and social capital theory share commonalities with the new institutional theory in terms of interactions among different segments with a focus on a central agent that coordinates these interactions.

Social Network Theory

The past four decades or so has witnessed considerable interest in network analysis. The interest in networks spans all of the social sciences and is rising even faster in physics, epidemiology, and biology. In management research, the concept has been used to draw on performance, turnover, promotion, innovation, creativity and ethical behavior (see Brass et al., 1998; Burt, 2004; Kilduff & Krackhardt, 1994; Obstfeld, 2005; Sparrowe et al., 2001). Yet there are still discrepancies as to whether it is a theory or a methodology, and by extension what

should be the key elements of a network. In the contribution of Hass (2009), there is no unified theory of social network, but rather an avalanche of theories have been proposed or adopted in describing or predicting the various pattern of interactions which take place.

According to Borgatti and Halgin (2011), social network analysis encompasses two distinct domains: network theory itself and theory of networks. To them, network theory refers to the mechanisms and processes that interacts with network structures to yield certain outcomes for individuals and groups. To other researchers, network theory is all about the consequences of network variables, such as having a multiplicity of ties or being centrally located (Brass 2002). However, theory of networks according to Brass (2002) on the other hand emphasizes on the processes that determine why networks have the structures they do—the antecedents of network properties. The centrality component of network theory makes the theory akin to the institutional theory that equally draws on interaction among different elements.

The Role of Institutional Development on Innovation

According to Mothe (2004), institutions are the conduit through which ideas are formed and flow, from government labs, firms (small and large), universities, and agencies, providing community services, and developing the notion of what he termed as “constructed advantage”.

Institutional development holds the key to innovation and this has been researched extensively by Lundvall (1992) and in most recently Nelson (2008) and Rasiah et al. (2016). Lall and Teubal (1998) and Lall (1994) had discussed the industrialized the experience of East Asian nations, which sought to emphasize on the importance of coordination between research and development (R&D), training, investment and product development for improved performance. Nelson on the other hand posits that the embedding organizations and institutions actively advance the role of technologies in each industry. In collaborating this assertion, Rasiah et al. (2016) in an attempt to examine the relationship between host-site institutional support, innovation capabilities and exports observed that innovation capabilities is correlated with institutional support, and that it also enjoyed a positive relationship with export.

At the firm level, Barasa et al. (2017) were able to prove that firm-level resources vary depending on the institutional environment and that regional institutional quality positively moderates the effects of the firm-level resources.

Dollar and Kraay (2003) argued that properly designed institutions can stimulate productive behaviors, yet weak institutions often lead to unproductive behaviors (Greif 2006)). Institutions can reduce transaction costs and uncertainty and ease coordination between economic agents (Alonso & Garcimartin, 2013). Institutional quality encompasses (1) the process by which a government is selected, monitored and replaced (2) a government’s capacity to effectively formulate and implement sound policies and (3) the economic and social interactions between citizens and the state are governed (Kaufmann & Mastruzzi, 2013). As such, the institutional environment can influence the propensity of firms to innovate in a variety of ways (North 1993). For instance, weak enforcement of regulations and the absence of intellectual property rights may hinder innovation. Compared to countries in Latin America, Southeast Asia and Middle East and North Africa, countries in sub-Saharan Africa perform poorly in upholding the rule of law, regulatory quality, control of corruption and government effectiveness (Alence 2004).

The Impact of institutional development on national Development

The impact of institutions on development (growth) is indirect because institutions do not produce goods and services that are tangible, yet the institutional approach posit that both the amount and productivity of resources depend on the institutional environment. Seputiene (2009) asserts that a well-defined institution reduce uncertainty, decrease macroeconomic volatility, stimulate specialization, lower transaction costs, and invariably foster investments and innovation.

Studies on the empirical evidence of the impact of institutions on economic growth abound in manifold, but with mixed results. Knack and Keefer (1995) study is credited with being among the early contributors to this discourse with a proposition that supports the assertion that institutions causes growth. In the said study, there is an attempt to quantify the relationship between institutions, investment, and growth using alternative indicators. The research findings strongly indicate that institutions that protect property rights are crucial to economic growth and to investment. This effect of institutions on growth persists even when controlled in a regression model for investment. This goes to affirm the preposition that the security of property rights affects not only the magnitude of investment, but also the efficiency with which inputs are allocated. This empirics is supported in a similar study by DeLong and Shleifer (1993) that asserts that good institutions in the form of predictable and stable rules of law, efficiency bureaucracy, and property rights security are linked with economic growth.

Acemoglu et al. (2001) in a related study corroborated the effect of institution on growth in the European context. In the said study, the researchers treat European colonialism as a natural experiment and hypothesized that European colonizers imposed different types of institutions on their former colonies depending on whether those colonies were suitable for European settlement. They however conclude that institutions have a large effect on economic growth.

The importance of institutions for development in terms of per capita incomes, infant mortality and adult literacy have been corroborated in related studies by Kaufmann et al. (1999, 2002). Moreover, Seputiene (2009) undertook a study aimed at exploring and quantifying the relationship of countries' income level with institutional environment, geography and openness to trade across the European Union. He concludes that there was a strong and positive link between various measures of institutions and economic development. The study also supported the primacy of institutions over openness to trade and geography. In a recent study, a typical a Solow and Mankiw et al. models were augmented with institutional factors to cover 153 countries (1994-2009). Specific variants of institutional inputs such as democracy, economic freedom and the ease of doing business were used in a regression analysis. The empirical findings confirmed a large positive impact of the quality of the institutional environment on the level of economic development, which was measured by the 2005-2009 GDP per capita at PPP (Próchniak 2013).

However, the most comprehensive cross-sectional study in recent times has been conducted by Barro and Sala-i-Martin (2003) and Pellegrini (2011b). In both studies, about 100 and 106 countries respectively have been sampled (1965-1995 and 1996-2005 respectively). Their results suggested that democracy, measured by electoral right from the Freedom House shows a nonlinear relationship with the growth rate of GDP. Moreover, they also found nonlinearities in other institutional inputs like civil liberties. On the other hand, other institutional inputs like the quality of bureaucracy revealed a positive linear relationship on economic development. Other institutional factors were also tested using dummy variables that represented colony (i.e. French, Spanish/Portuguese etc.), landlocked and legal-structure (British and French). Rivera-batiz (2002) tested political rights index compiled by the Freedom House as well as the quality of governance indicator compiled by Hall and Jones in 59 countries within the years 1960-1990. This research confirmed that the quality of governance positively and significantly affects economic growth. Leblang (1997) and Feng (1997) both analyzed democracy index from Gurr and Bollen for 91 and 96 countries during 1960-1989 and 1960-1980 respectively. Institutional factors like democracy, the probabilities of government changes have been understudied. Both studies converged that initial level of democracy positively and significantly influences GDP dynamics. However, Feng's study had a twofold impact: the direct impact was negatively associated with growth, whereas the indirect impact was positive because of the influence of the probability of government changes.

Moreover, important regular government changes favorably affect macroeconomic performance, whereas irregular changes had the opposite effect. Other institutional factors like economic freedom and the level of democracy have been understudied on an extensive variation by Próchniak and Witkowski (2012; 2013) on GDP growth using an innovative method of Bayesian model averaging. They conclude that economic freedom is one of the main drivers of growth in the EU. In explaining worldwide differences in economic development, Próchniak (2013) concluded that differences in physical capital, human capital and the institutional environment (measured by governance indicators) explained nearly 75% of the differences in economic development among 153 countries during the period 1994-2009.

In contrast, there are other studies that have had opposing views on the relationship between institutions and economic growth. For instance, Glaeser et al. (2004) points out that growth rather improves institution and that such a hypothesis regarding institutions causing growth is non-existent. The OLS cross-country evidence for 1960-2000 used provided no support to the purported claim of institutions causing growth. Plumper and Martin (2003) analyzed the relationship between democracy level and growth in 83 countries within the period 1975-1997. They found a nonlinear relationship between democracy and economic growth. They also concluded that the highest GDP dynamics were recorded by those countries that have had relatively moderate level of democracy.

2.4 Innovation-Development Perspectives

2.4.1 Innovation Policy

According to Hadjimanolis and Dickson (2001), the role of science and technology in economic development only came to be appreciated after the Second World War. Specific policies to realize the full of science and technology have since been the fulcrum national progress, initially in the developed world and later, through the process of gradualism, it's been extended to developing economies (Sagasti 1989). Yet the application in developing countries such as the ones in sub-Sahara Africa has been almost non-existent till the late 1980s.

Innovation according to researchers such as Sundbo (2003), is combination of knowledge that result in new products, processes, input and output markets, or organization (not only technical innovation) but also organizational and managerial innovations, new markets, new sources of supply, financial innovations, and new combinations (Perlman and Heertje, 1991). To Padilla-Perez and Gaudin (2014), innovation is an interactive and gradual process, based on communication and knowledge exchange. Carayannis et al. (2006) have argued that in a knowledge-based economy, innovation through the creation, diffusion and use of knowledge has become a catalyst in the build up to economic growth. Rycroft and Kash (1999) pointed out that innovation policy is a complex process, not a single product, but as a result of a set of programs and policies, involving institutions.

However, innovation come in different forms and facades. For instance, industrial innovation includes manufacturing, technical design, management and commercial activities used in the marketing of a new (or improved) product or the first commercial use of a new process or equipment (Freeman 1982). Huang et al. (2007) are of the opinion, the factors required for industrial innovation are in manifold and may include technical knowledge, manpower, market information, financial resources, R&D environments, a domestic market and an international market (Rothwell and Zegveld, 1982). Many researchers (see Barro, 1990; Mcmillan & Rodrik, 2011; Rothwell & Zegveld, 1982) have proven and made a case that indeed, industrial innovation can increase overall economic development. Finding the right measure of innovation has given rise to intellectual argument. Huang et al. (2007) in a quick rebuttal had pointed out that macro measures such as R&D tax credit are not effective and pointless, and that policies must be designed to influence particular economic sectors. Product innovation differs from the generic concept, as it is basically the introduction of new good or service or the significant improvement of existing product with respect to its characteristics and intended use (Ayyagari et al., 2012; Barasa et al., 2017). But Salmenkaita and Salo (2002) disagreed and emphasized that there are no straightforward answers to the question of what should constitute an innovation policy.

Lundvall et al. (2009) defined national system of innovation (NSI) as systems that encompass the relationships both within and between organizations, institutions and socio-economic structures, which determines the direction and rate of innovation and technological capability building. Unlike NIP, innovation systems are made up of components (private enterprises, universities, research centers and government among others), the relationships among them and institutions (Padilla-Perez & Gaudin, 2014). One key distinguishing feature of NSI is that, the concept does not necessarily suggest a structure designed and built in a formal and conscious manner, but rather includes individuals, organizations and institutions whose interactions determines their overall innovative performance.

According to Padilla-Perez and Gaudin (2014), governments' role as far as innovation system is concern may be in twofold: (1) government generate and disseminate new knowledge through public research centers, universities and enterprises and, (2) government creates and modify institutions that supports state technology innovation (STI). Government achieves this through a host of other policy instruments such as trade policies, public investment, and support for small and medium scale enterprises, training and education and regional development.

3. A simple Conceptual Framework of Innovation and Development

In this section, we harmonize the various theories and concepts into a conceptual framework on the innovation – development connection. This framework may be used as a guide by academicians and practitioners in understanding the mechanisms through which institutional development affects innovation policy and ultimately how national innovation affects national development. According to Chinn and Kramer (1999), a framework can be seen as a complex mental formulation of experience. They further elucidate by distinguishing it from a theoretical framework. They assert that, while theoretical framework is the theory on which the study is based, the conceptual framework deals with the operationalization of the theory. In other words, it represents the position of the researcher on the problem at hand and at the same time gives direction to the study. It may be entirely new, or an adoption of, or adaptation of, a model used in previous research with modification to fit the context of the inquiry (Chinn & Kramer, 1999).

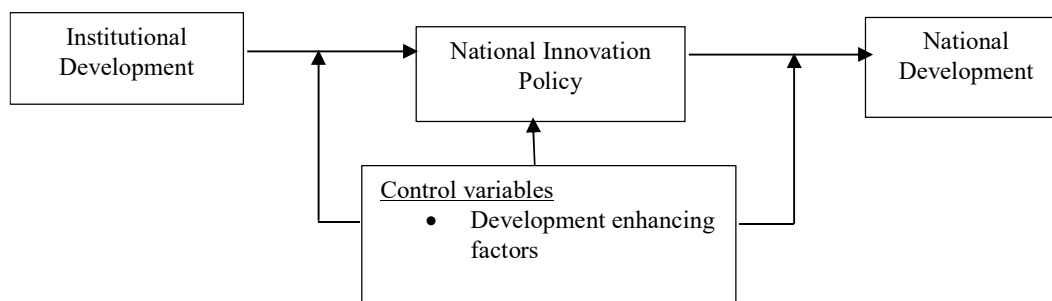
The framework developed in this study has three components: the role of institutional development on innovation policy, the impact of innovation on development and the mediating role of institutional effectiveness in national development. The in-depth literature survey on innovation and development provides the necessary ingredients for the construction of the framework. First, the extant literature shows that institutional development is very crucial to spur innovation. Institutions define the rule of the game and shape human behavior and interaction according to North (1993). Dollar and Kraay (2003) posited that properly designed institutions can stimulate productive behaviors, yet weak institutions often lead to unproductive behaviors (Greif 2006)). Institutions can reduce transaction costs and uncertainty and ease coordination between economic agents (see Alonso & Garcimartin, 2013; Barasa et al., 2017; de la Mothe, 2004; Nelson & Nelson, 2002; Rasiah et al., 2016). Institutional quality encompasses the process by which a government is selected, monitored and replaced, secondly a government's capacity to effectively formulate and implement sound policies and thirdly the economic and social interactions between citizens and the state governed. Indicators under the World Bank Governance index is crucial in this regard.

The second component of the framework deals with the question of “*what*” is innovation and how is it measured. The literature survey on innovation brought to the fore a definition that was encompassing, thus innovation is the combination of knowledge that result in new products, processes, input and output markets, or organization (not only technical innovation) but also organizational and managerial innovations, new markets, new sources of supply, financial innovations, and new combinations (see Perlman & Heertje, 1991; Sundbo, 2003). There are disagreement with regard to what should be the appropriate proxy for innovation. The World

Bank in its annual report have measured regional innovation using the amount of scientific and technical journal articles in existence (Oyelaran-Oyeyinka 2012; Oyelaran-Oyeyinka 2014; World Bank 2009). However, it failed to explicate on the quality of the so-called scientific and technical journal. Journal articles could proliferate with most of them unable to advance knowledge that spur innovation given the increasing number of predatory journal articles on the rise. The quality of research churn out leaves much to be desired. Therefore, in this study, we believe government role in spending on infrastructure and the provision of tax-haven for hi-tech industries is a surety to the path of innovation.

The third component of the framework focuses on national development. Development is a concept as has been established is broad. *Yet for measurement purposes, in contemporary times, development have been equated to economic growth (a subset of development) using per capita income as probable proxy. With the criticisms leveled against the growth dimension, there is call to go beyond GDP (see Aidt, 2010; Forson et al., 2017; Forson, 2016a). The sustainability strand have brought to the fore a number of measurements that includes wealth per capita, HDI, SDI just to mention a few (see Costanza et al., 2007; Costanza et al., 2009; Hadjimanolis & Dickson, 2001; Vemuri & Costanza, 2006). A distinctive feature of the framework is that, it shows the link that builds up from institutional development to innovation and how innovation affects national development using national output as the trajectory of a particular region as shown in Figure 1:*

Figure 1: A simple framework of innovation and development



Source: Authors construct

It can be visibly observed from the framework that institutional development provides the much needed drive for innovation to thrive. Institutions shape human behavior and interaction and thus it takes the coordination of institution to create a suitable environment for the development of acumen through lifelong learning. According to McGuirk et al. (2015), the role of individuals and the significance of their influence to innovation activities is now widely recognized. Human capital formation as a consequential effect of formal education and on-the-job training (see Romer, 1994), is viewed and understood to be the principal source of innovation (Al-Laham et al., 2011). In the words of Olson Jr et al. (2000), the differences in the quality of governance have led to varied growth rates in developing countries. Other empirical studies also point at the critical role of institutions for economic growth and development in developing countries (Glaeser et al., 2004; Greif, 2006; Ouwatobi et al., 2015; Tebaldi & Elmslie, 2008). Acemoglu et al. (2004) show that countries with weak institutions report slow growth. In particular, such countries exhibit a high degree of political instability, widespread corruption, weak protection of property rights and weak functioning markets (see Tebaldi & Elmslie, 2008a, 2008b).

On a continuum, regional institutional quality impacts the relation between human capital and innovation through the rate of enrollment in schools and the quality of education provided (Heyneman 2004). Teachers in developing countries according to Biswal (1999) are frequently absent or compensate their limited wages by having bribes built into their pay structure. As such, the actual skills conducive to innovation possessed by skilled labor are likely to be relatively low in regions with low regional institutional quality. Other scholars such as Varsakelis (2006) have argued that improving regulatory quality could lead to the adoption of a science oriented educational system, which in turn would stimulate the innovative productivity of a country (Tebaldi, & Elmslie 2013). Based on these perspectives, the study hypothesis that:

H1. There is a positive significant relationship between institutional quality and innovation

The second component of the framework as can be inferred is on innovation. What the framework sought to articulate here is that innovation does not spring out by chance but through the coordination of institution and the gains from previous investments determined by the wealth of the region. Padilla-Perez and Gaudin (2014) explained innovation as an interactive and gradual process, based on communication and knowledge exchange. Rycroft and Kash (1999) argued that innovation policy is a complex process, not a single product, but as a result of a set of programs and policies, involving institutions. Therefore, the study hypotheses that:

H2. The state of innovation and national development is a consequence of institutional quality and the

wealth of the region.

The third and final component of the framework links innovation to national development with institution and development enhancing factors acting as facilitators. The implication drawn from this part of the framework is that, innovation helps to drive development and address socio-economic challenges such as poverty and health. Many growth-enhancing innovations also address social challenges. For instance, in places such as India (Green Revolution of the 1960s), innovation led to the introduction of high-yield varieties and seeds and increased use of fertilizers and irrigation. This resulted in a substantial increase in grain production. This not only raised agricultural productivity but also directly addresses food scarcity among the country's poor (see Hadjimanolis & Dickson, 2001; Lundvall & Borrás, 2005; OECD, 2012; Oyelaran-Oyeyinka, 2014). Based on the perspective highlighted, the study hypothesizes that:

H3. There is significant positive relationship between innovation and development.

The conceptual framework shown is of the view that it takes the efforts of institutions and the environment to induce innovation and that innovation help address social challenges and improves the general well-being of people.

4. Discussion and Recommendation

Most backward economies in the world are agrarian dominated ones with well over 60% of the population engaged in agric. To make matters worse, the policies of international organizations like the IMF and the World Bank have consistently disincentive these countries from adding value to agriculture produce before export (see Cypher & Dietz, 2009). According to Cypher and Dietz (2009), most developing economies in sub-Sahara Africa export more than two-thirds of their agriculture produce to the international market without any value addition.

To move from such a situation will demand a structural transformation with the application of science and technology being the pinnacle of such a drive, and it can only be initiated through a rigorous institutionalization of science, technology and innovation. This is where the role of institution becomes indispensable. Without an effective institutional framework, developing economies will continue to trail behind the westerners in the trajectory to development. But the key question to ask is that, is institutional development the only ingredient needed to spur innovation? The answer is emphatically no. Most developing economies have one way or the other had varying degree of policy briefs and documents with the corresponding framework on innovation in the past, but the environment to support these initiatives has been lacking. According to Licht and Siegel (2006), the levels and modes of innovative and entrepreneurial activity should be affected by the surrounding institutions. Although most economies have alluded to this fact, the challenge is with the kind of shift to undertake to inspire innovation. It should be noted that the environment for entrepreneurship along with differences in technological opportunities, the characteristics of economic spillovers between universities and private firms, along with cultural factors can impact the level and types of entrepreneurial activity occurring. In addition to the function of an efficient institutional framework, there ought to be the provision of financial support to facilitate the activities of institutions.

From the proposed framework, development is broad and thus requires a multiple approach to dealing with its challenges, but innovation, which is the application of knowledge holds the key to alter the structure of the economies and bring progress. Considering the framework, a number of research areas can be pursued to benefit research and practice on innovation and development. It is recommended that future research will have to determine empirical support either for the entire framework or segment of it. Efforts must go into the evolution of a proxy for innovation. It still remains a contentious subject as to whether the concept should be aligned with infrastructure or knowledge building through the number of scientific journal publication.

5. Conclusion

This paper proposes a conceptual framework on the relationship between innovation and development. The paper explores the ingredients for a smooth takeoff of innovation drive through science and technology in developing economies. A rigorous literature-based analysis is employed by considering concepts from innovation and development. A synthesis of the various concepts and constructs leads to the development of a three-pronged conceptual framework.

The framework developed in this study has three components: the role of institutional development on innovation policy, the impact of innovation on development and the mediating role of institutional effectiveness in national development. The first component highlights the role of institution in the buildup to innovation. The extant literature shows that institutional development is very crucial to spur innovation. Institutions define the rule of the game and shape human behavior and interaction according to North (1993). The second component of the framework as can be inferred is on innovation. What the framework sought to articulate here is that innovation does not spring out by chance but through the coordination of institution and the gains from previous investments determined by the wealth of the region. The third and final component of the framework links

innovation to national development with institution and development enhancing factors acting as facilitators. The implication drawn from this part of the framework is that, innovation helps to drive development and address socio-economic challenges such as poverty and health. The paper concludes by pointing out that, the environment plays an important role for institutions to function. The pro-activeness of institutions is contingent on the environment necessary for them to thrive. That is, public funding of innovation drive cannot be decouple from institutional framework and that is what developing economies must realize and embrace to bring about the structural change so desired.

Acknowledgement: The authors sincerely express their special gratitude to University of Science and Technology of China for providing the necessary facilities to carry out our study.

Author Contributions: ABUBAKARI Sadiq Mohammed and PENG Xiabao designed the study, ABUBAKARI Sadiq Mohammed and KARIMU ABDUL- RASHID performed the research, analyzed and wrote the paper, Adam Hikima gave many good research advises and adjusted the paper.

Conflict of interest: The authors declare that there is no conflict of interest.

Reference

- Acemoglu, D., Johnson, S., & James, A. (2001). The Colonial Origins of Comparative Development: An Empirical Investigation. *American Economic Review*, 91(5), 1369–1401. <https://doi.org/10.1257/aer.91.5.1369>
- Acemoglu, D., Johnson, S., & Robinson, J. (2004). Institutions as the Fundamental Cause of Long-Run Growth. In *NBER working paper*. Retrieved from http://www.nber.org/papers/w10481.pdf?new_window=1
- Aidt, T. S. (2010). Corruption and Sustainable Development. *International Handbook on the Economics of Corruption*, 2(4), 219–250.
- Al-Laham, A., Tzabbar, D., Amburgey, T. L. (2011). The dynamics of knowledge stocks and knowledge flows: innovation consequences of recruitment and collaboration in biotech. *Industrial and Corporate Change*, 20(2), 555–583. <https://doi.org/10.1093/icc/dtr001>
- Alence, R. (2004). Political institutions and developmental governance in sub-Saharan Africa. *The Journal of Modern African Studies*, 42(2), 163–187. <https://doi.org/10.1017/S0022278X04000084>
- Alonso, J.A., & Garcimartin, C. (2013). The determinants of institutional quality. More on the debate. *Journal of International Development*, 25(2), 206–476.
- Ayyagari, M., Demircuc-Kunt, A., Maksimovic, V. (2012). Firm innovation in emerging markets: the role of finance, governance, and competition. *Journal of Financial Quantitative Analysis*, 46(6), 1545–1580.
- Barasa, L., Knoblen, J., Vermeulen, P., Kimuyu, P., & Kinyanjui, B. (2017). Institutions, resources and innovation in East Africa: A firm level approach. *Research Policy*, 46(1), 280–291. <https://doi.org/10.1016/j.respol.2016.11.008>
- Barro, R.J., & Sala-i-Martin, X. (2003). *Economic Growth* (2nd ed.). Cambridge: MA: The MIT Press.
- Barro, R. J. (1990). Government spending in a simple model of endogenous Growth. *Journal of Political Economy*, 98(5). Retrieved from <http://www1.worldbank.org/publicsector/pe/pfma06/BarroEndogGrowthJPE88.pdf>
- Becker, G. S. (1975). *Human Capital: A Theoretical and Empirical Analysis, with Special Reference to Education*. (2nd ed.). New York: National Bureau of Economic Research. Retrieved from <http://www.nber.org/chapters/c3733.pdf>
- Biswal, B. P. (1999). Private tutoring and public corruption: a cost-effective education system for developing countries. *The Developing Economies*, 37(2), 222–240. <https://doi.org/10.1111/j.1746-1049.1999.tb00232.x>
- Borgatti, S.P., & Halgin, D. S. (2011). On Network Theory. *Organizational Science*, 22(5), 1–14. <https://doi.org/10.1287/orsc.1110.0641>
- Brass, D.J., Butterfield, K.D., & Skaggs, B. C. (1998). Relationships and unethical behavior: A social network perspective. *Academy of Management Review*, 23(1), 14–31. <https://doi.org/10.5465/AMR.1998.192955>
- Brass, D. J. (2002). *Social networks in organizations: Antecedents and consequences*. University of Kentucky, Lexington. Retrieved from www.analytictech.com/networks/brass_consequences.doc
- Brundtland Commission. (1987). *Our Common Future*. New York: Oxford University Press. Retrieved from http://conspect.nl/pdf/Our_Common_Future-Brundtland_Report_1987.pdf
- Burt, R. S. (2004). Structural holes and good ideas. *American Journal of Sociology*, 110(2), 349–399. <https://doi.org/10.1086/421787>
- Carayannis, E.G., Popescu, D., Sipp, C., Stewart, M. (2006). Technological learning for entrepreneurial development (TL4ED) in the knowledge economy (KE): case studies and lessons learned. *Technovation*, 26(1), 419–443.

- Chinn, P.L., & Kramer, M. K. (1999). *Theory and Nursing: Integrated Knowledge Development* (5th ed.). St. Louis: Mosby Inc.
- Costanza, R., Fisher, B., &. (2007). Quality of Life: An Approach Integrating Opportunities, Human Needs, and Subjective Well-Being. *Economic Economics*, 61(2-3), 267-276. <https://doi.org/10.1016/j.econecon.2006.02.023>
- Costanza, R., Hart, M., Posner, S., & Talberth, J. (2009). *Beyond GDP: the Need for New Measures of Progress*. Boston MA. Retrieved from <http://www.bu.edu/pardee/files/documents/PP-004-GDP.pdf>
- Cypher, J. M. & Dietz, J. L. (2009). *The process of Economic Development* (3rd ed.). London and New York: Rutledge.
- de la Mothe, J. (2004). The institutional governance of technology, society, and innovation. *Technology in Society*, 26(2-3), 523-536. <https://doi.org/10.1016/j.techsoc.2004.01.009>
- DeLong, B. & Shleifer, A. (1993). Princes and Merchants: European City Growth before the Industrial Revolution. *Journal of Law and Economics*, 36(5), 671-703. <https://doi.org/10.3386/w4274>
- Dollar, D., & Kraay, A. (2003). Institutions, trade, and growth. *Journal of Monetary Economics*, 50(1), 133-162. [https://doi.org/10.1016/S0304-3932\(02\)00206-4](https://doi.org/10.1016/S0304-3932(02)00206-4)
- Dowling, J.M., & Valenzuela, M. R. (2010). *Economic Development in Asia* (2nd ed.). Singapore: CENGAGE Learning.
- Ersson, S. & Lane, J. (1996). Democracy and Development: A Statistical Exploration. In *Democracy and Development: Theory and Practice*. Adrian, L. (pp. 45-73). Cambridge: Polity Press.
- Evans P., & Reuschmeyer, D. (1985). The State and Economic Transformation: toward an analysis of the conditions underlying effective intervention. In *Evans, P., Rueschemeyer, D., and Schocpol, T. Bringing the state back in*. Cambridge: Cambridge University Press.
- Feng, Y. (1997). Democracy, Political Stability and Economic Growth. *British Journal of Political Science*, 27(3), 391-418. Retrieved from <http://www.jstor.org/stable/194123>
- Forson, J.A., Buracom, P., Chen, G., & Baah-Ennumh, T. Y. (2017). Genuine Wealth Per Capita as a Measure of Sustainability and the Negative Impact of Corruption on Sustainable Growth in Sub-Sahara Africa. *South African Journal of Economics*, 85, 1-18. <https://doi.org/10.1111/saje.12152>
- Forson, J. A. (2016). A “recursive framework” of corruption and development: comparison between economic and sustainable outcomes. *World Journal of Entrepreneurship, Management and Sustainable Development*, 12(4), 282-298. <https://doi.org/10.1108/WJEMSD-05-2016-0027>
- Freeman, C. (1982). *The Economics of Industrial Innovation*. Cambridge: MIT Press.
- Glaeser, E.L., La Porta, R., Lopez-de-Silanes, F., & Shleifer, A. (2004). Do Institutions Cause Growth? *Journal of Economic Growth*, 9(3), 271-303. <https://doi.org/10.3386/w10568>
- Goto, K. (1997). The Search of Strategic Management Capability: Lessons from the East Asian Miracle. In S. Yanagihara, T. & Sambommatsu (Ed.), *East Asian Development Experience: Economic Systems Approach and its Applicability*. Tokyo: Institution of Development Economics.
- Greif, A. (2006). *Institutions and the Path to the Modern Economy: Lessons from Medieval Trade*. *Journal of Political Economy*. New York: Cambridge. Retrieved from http://www.stanford.edu/~avner/Greif_Institutions/01Chapter1Introduction.pdf
- Hadjimanolis, A., & Dickson, K. (2001). Development of national innovation policy in small developing countries: the case of Cyprus. *Research Policy*, 30(1), 805-817. [https://doi.org/10.1016/S0048-7333\(00\)00123-2](https://doi.org/10.1016/S0048-7333(00)00123-2)
- Hass, M. (2009). *Social network theory and analysis: a preliminary exploration* (No. 5). Sydney. Retrieved from https://www.uts.edu.au/sites/default/files/wp2009_5.pdf
- Heyneman, S. P. (2004). Education and corruption. *International Journal of Educational Development*, 24(6), 637-648. <https://doi.org/10.1016/j.ijedudev.2004.02.005>
- Howitt, P. (2008). Endogenous Growth. In S. D. & L. Blume (Ed.), *The New Palgrave Dictionary of Economics* (2nd ed., pp. 36-78). New York: Palgrave Macmillan.
- Huang, C.Y., Shyu, J.Z., & Tzeng, G. H. (2007). Reconfiguring the innovation policy portfolios. *Technovation*, 27(1), 744-765. <https://doi.org/10.1016/j.technovation.2007.04.002>
- Kaufmann, D., Kraay, A., & Zoido-Lobaton, P. (1999). *Governance Matters*.
- Kaufmann, D., Kraay, A., & Zoido-Lobaton, P. (2002). *Governance Matters II: Updated Indicators for 2000/01*. (No. 3106). Retrieved from http://siteresources.worldbank.org/DEC/Resources/WPS2772_2002.pdf
- Kaufmann, D., Kraay, A., & Mastruzzi, M. (2013). Worldwide Governance Indicators. Retrieved from <http://info.worldbank.org/governance/wgi/index.aspx#home>
- Kilduff, M., & Krackhardt, D. (1994). . Bringing the individual back in: A structural analysis of the internal market for reputation in organizations. *Academy Management Journal Management*, 37(1), 87-108.
- Knack, S. & Keefer, P. (1995). Institutions and Economic Performance: Cross Country Tests Using Alternative Institutional Measures. *Economics and Politics*, 7(3), 207-227. <https://doi.org/10.1111/j.1468->

- 0343.1995.tb00111.x
- Leblang, D. A. (1997). Political Democracy and Economic Growth: Pooled Cross-Sectional and Time Series Evidence. *British Journal of Political Science*, 27(3), 453–466. Retrieved from <http://www.jstor.org/stable/194125>
- Licht, A.N., & Siegel, J. I. (2006). The social dimensions of entrepreneurship. In M. Casson, B. Yeung, eds. *Oxford Handbook of Entrepreneurship*. Oxford: Oxford University Press.
- Lundvall, B.A., & Borrás, S. (2005). Science, technology, and innovation policy. In Fagerberg, J., et al. (Eds.), *The Oxford Handbook of Innovation*. New York: Oxford University Press.
- Lundvall, B.Å., Joseph, K.J., Chaminade, C., Vang, J. (2009). *Handbook of Innovation Systems and Developing Countries: Building Domestic Capabilities in a Global Setting*. Cheltenham: Edward Elgar.
- Mankiw, N. G., Romer D., & Weil, D. N. (1992). A Contribution to the Empirics of Economic Growth. *Quarterly Journal of Economics*, 107(2), 407–437. <https://doi.org/10.3386/w3541>
- McGuirk, H., Lenihan, H., & Hart, M. (2015). Measuring the impact of innovative human capital on small firms' propensity to innovate. *Research Policy*, 44(4), 965–976. <https://doi.org/10.1016/j.respol.2014.11.008>
- McMillan, M.S., & Rodrik, D. (2011). *Globalisation, Structural change and productive growth* (17143).
- Mincer, J. (1975). *Schooling, Experience and Learning*. New York: National Bureau of Economic Research. Retrieved from <http://www.nber.org/chapters/c3693.pdf>
- Moghalu, K. C. (2014). Why has Africa fallen behind the rest of the World's Economy? Retrieved August 19, 2017, from <https://www.theguardian.com/global-development/2014/aug/04/africa-fallen-behind-economies-science-technology>
- Myrdal, G. (1974). What Is Development? *Journal of Economic Issues*, 8(4), 729–736. Retrieved from <http://www.jstor.org/stable/4224356>
- Nelson, R. R., & Nelson, K. (2002). Technology, institutions, and innovation systems. *Research Policy*, 31(2), 265–272. [https://doi.org/10.1016/S0048-7333\(01\)00140-8](https://doi.org/10.1016/S0048-7333(01)00140-8)
- North, D. C. (1993). The New Institutional Economics and Development. Retrieved October 10, 2013, from [http://www.deu.edu.tr/userweb/sedef.akturk/Current topics in Turkish Economy/north.pdf](http://www.deu.edu.tr/userweb/sedef.akturk/Current%20topics%20in%20Turkish%20Economy/north.pdf)
- Obstfeld, D. (2005). Social networks, the tertius iungens orientation, and involvement in innovation. *Administrative Science Quarterly*, 50(1), 100–130. <https://doi.org/10.2189/asqu.2005.50.1.100>
- OECD. (2012). *Innovation for Development: A Discussion of the Issues and an Overview of the OECD Directorate for Science, Technology and Industry*. Paris. Retrieved from <http://www.oecd.org/innovation/inno/50586251.pdf>
- Olson Jr., M., Sarna, N., Swamy, A.V. (2000). Governance and growth: A simple hypothesis explaining cross-country differences in productivity growth. *Public Choice*, 102(3–4), 341–364.
- Ouwatobi, S., Efobi, U., Olurinnola, I., & Alege, P. (2015). Innovation in Africa: Why Institutions Matter. *South African Journal of Economics*, 83(3), 390–410. <https://doi.org/10.1111/saje.12071>
- Oyelaran-Oyeyinka, B. (2012). Institutional capacity and policy for latecomer technology development. *International Journal of Technological Learning Innovation and Development*, 5(1/2).
- Oyelaran-Oyeyinka, B. (2014). The State and Innovation Policy in Africa. *African Journal of Science, Technology, Innovation and Development*, 6(5), 481–496. <https://doi.org/10.1080/20421338.2014.983731>
- Padilla-Perez, R., & Gaudin, Y. (2014). Science, technology and innovation policies in small and developing economies: The case of Central America. *Research Policy*, 43(1). <https://doi.org/10.1016/j.respol.2013.10.011>
- Pellegrini, L. (2011). Causes of Corruption: A Survey of Cross-Country Analysis and Extended Results. In *Corruption, Development and the Environment* (pp. 29–49). Berlin: Springer. <https://doi.org/10.1007/978-94-007-0599-9>
- Perlman, M., and Heertje, A. (1991). *Evolving Technology and Market Structure: Studies in Schumpeterian Economics*. Michigan.: University of Michigan Press.
- Plumper, T., & Martin, C. W. (2003). Democracy, Government Spending and Economic Growth: A Political-Economic Explanation of the Barro-Effect. *Public Choice*, 117(1/2), 27–50. Retrieved from <http://www.jstor.org/stable/30025887>
- Prochniak, M., & Witkowski, B. (2012). Bayesian Model Averaging in Modeling GDP Convergence with the use of Panel Data. *Roczniki Kolegium Analiz Ekonomicznych SGH*, 26, 45–60.
- Prochniak, M., & Witkowski, B. (2013). Time stability of the beta convergence among EU countries : Bayesian model averaging perspective. *Economic Modelling*, 30, 322–333. <https://doi.org/10.1016/j.econmod.2012.08.031>
- Prochniak, M. (2013). To What Extent Is the Institutional Environment Responsible for Worldwide Differences in Economic Development. *Contemporary Economics*, 7(3), 17. <https://doi.org/10.5709/ce.1897-9254.87>
- Rasiah, R., Shahrivar, R. B., & Yap, X.-S. (2016). Institutional support, innovation capabilities and exports: Evidence from the semiconductor industry in Taiwan. *Technological Forecasting and Social Change*, 109,

- 69–75. <https://doi.org/10.1016/j.techfore.2016.05.015>
- Rivera-Batiz, F. L. (2002). Democracy, Governance and Economic Growth. *Review of Development Economics*, 6(2), 225–247. <https://doi.org/10.1111/1467-9361.00151>
- Romer, P. (1994). New Goods, Old Theory, and the Welfare Costs of Trade Restrictions. *Journal of Development Economics*, 43(1), 5–38. [https://doi.org/10.1016/0304-3878\(94\)90021-3](https://doi.org/10.1016/0304-3878(94)90021-3)
- Rothwell, R., & Zegveld, W. (1982). *Industrial Innovation and Public Policy: Preparing for the 1980s and the 1990s*. London: Printer.
- Rycroft, R., & Kash, D. (1999). *The complexity challenge*. London: Pinter.
- Sagasti, F. (1989). Science and technology policy research for development: an overview and some priorities from a Latin American perspective. *Bulletin of Science, Technology & Society*, 9(1). <https://doi.org/10.1177/027046768900900107>
- Salmenkaita, J.P., & Salo, A. (2002). Rationales for government intervention in the commercialisation of new technologies. *Technology Analysis and Strategic Management*, 14(1), 183–200.
- Sen, A. K. (2000). *Development as Freedom*. New York: Anchor Books. Retrieved from <http://blog.lib.umn.edu/ipid/ipid/Dev.asFreedom-Sen-Ch.1.pdf>
- Seputiene, J. (2009). The Impact of Institutional Environment on Economic Development of the European Union Countries. Retrieved October 10, 2013, from <http://www.icabr.com/fullpapers/SeputieneJanina.pdf>
- Smits, J.P., & Hoekstra, R. (2011). *Measuring Sustainable Development and Societal Progress: Overview and Conceptual Approach*. Den Haag. Retrieved from <http://www.cbs.nl/NR/rdonlyres/C32647F1-1EBB-4CDF-861C-F80A8BD99CF3/0/measuringustainabledevelopment.pdf>
- Sparrowe, R. T., Liden, R.C., Wayne, S.J., Kraimer, M. L. (2001). Social networks and the performance of individuals and groups. *Academy Management Journal*, 44(2), 316–325.
- Sundbo, J. (2003). *Innovation as Strategic Reflexivity*. New York: Taylor & Francis.
- Talberth, D.J., Cobb, C., & Slattery, N. (2007). *The Genuine Progress Indicator 2006: A Tool for sustainable Development*. Retrieved from http://web.pdx.edu/~kub/publicfiles/MeasuringWellBeing/Talberth_2006_GPI.pdf
- Talberth, J. (2008). A New Bottom Line for Progress. In *2008 State of the World: Innovations for a Sustainable Economy*. New York: WW Norton & Company. Retrieved from http://www.worldwatch.org/files/pdf/SOW08_chapter_2.pdf
- Tebaldi, E., & Elmslie, B. (2008a). *Do Institutions Impact Innovation?* Munich.
- Tebaldi, E., & Elmslie, B. (2008b). *Institutions, Innovation and Economic Growth*. Munich.
- Tebaldi, E., & Elmslie, B. (2013). Does institutional quality impact innovation? Evidence from cross-country patent grant data. *Applied Economics*, 45(7), 887–900. <https://doi.org/10.1080/00036846.2011.613777>
- Todaro, M.P., & Smith, S. C. (2003). *Economic Development* (8th ed.). Boston: Addison Wesley.
- UNICEF. (2013). *Sustainable Development Starts and Ends with Safe, Healthy and Well-Educated Children*. Retrieved from http://www.unicef.org/ceecis/Sustainable_Development_post_2015.pdf
- United Nations. (2012). *The Millennium Development Goals Report*. New York. Retrieved from http://www.un.org/millenniumgoals/pdf/MDG_Report_2012.pdf
- United Nations. (2013a). *A New Global Partnership: Eradicate Poverty and Transform Economies Through Sustainable Development: The Report of the High-Level Panel of Eminent Persons on the Post-2015 Development Agenda*. New York. Retrieved from http://www.un.org/sg/management/pdf/HLP_P2015_Report.pdf
- United Nations. (2013b). *The Millennium Development Goals Report*. New York. Retrieved from <http://www.un.org/millenniumgoals/pdf/report-2013/mdg-report-2013-english.pdf>
- Varsakelis, N. C. (2006). Education, political institutions and innovative activity: A cross-country empirical investigation. *Research Policy*, 35(7), 1083–1090. <https://doi.org/10.1016/J.RESPOL.2006.06.002>
- Vemuri, A.W., & Costanza, R. (2006). The role of human, social, built and natural capital in explaining life satisfaction at the country level. *Ecological Economics*, 58(1), 119–133. <https://doi.org/10.1016/j.ecolecon.2005.02.008>
- World Bank. (2004). *What is Development?* Washington DC. Retrieved from http://www.worldbank.org/depweb/english/beyond/beyondco/beg_01.pdf
- World Bank. (2009). World Development Indicators. Retrieved May 18, 2010, from www.data.worldbank.org