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# FIRM LEVEL INNOVATION:THE CASE OF GHANAIAN FIRMS

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**ABSTRACT:** *Firm level innovation brings about new ideas, new products development, pioneering of new technologies and processes as well as the promotion of entrepreneurship. It is the major driver of economic growth and competitiveness in the global market economy. This study assessed the status of innovation among small, medium and large firms in Ghana. From the up-dated list of the Association of Ghana Industries (AGI) a sample of 500 manufacturing and service sector firms employing more than 10 people were purposively selected across the country. The primary data were collected through questionnaire, and then analysed using descriptive and inferential statistics. The individual entrepreneur or owner of the firm was the unit of analysis. The result showed that innovation in Ghana is more prevalent in the small firms compared to medium and large firms. The study noted that most of the employees with university degrees were employed by large multinational firms and medium firms that are part of large groups. It also emerged that more than half (59%) of the processed innovations were developed within the firms themselves and 21% of the innovative firms collaborated with other firms and institutions for their innovative activities. The paper argues that drawing lessons from the experience of the Asian Tigers, firm level innovation could aspire Ghana achieve higher economic growth for favourable competition in the global economy*.

**KEYWORDS**: Innovation, Firm Level, R&D, Economic Growth, Technological, Ghana.

## INTRODUCTION

The intense competition in international and local markets has rendered innovation the critical factor of firm level competitiveness and survival. More recently, the importance of innovation has been reinforced both by globalisation and rapid advances in new technologies, knowledge transfer and information flow. According to Cantwell (2003), Gault (2010) and Harary (2013), the ability to create economic value on new products, production processes and organizational practices is embedded in the innovative characteristics of a firm or industry. Innovation has thus created new forms of competition and opened new markets for new products and services. Studies such as Kleinknecht and Mohnen, (2002) Criscuolo and Haskel, (2003) Diederen, Mohnen, and Palm (2005) have linked innovation to firm productivity and performance. Firm level innovation is therefore critical to the competitive advantage and growth for firms, industries and countries (Romijn and Albaladejo, 2004; Abereijo et al., (2007). The literature on firm-level innovation clearly underscores the need for a strong focus on firm-level innovation to spur socio-economic growth.

Today, innovation performance is a crucial determinant of national progress. According to Nesta (2009), an innovative economy is more productive and grows faster. For example, between 2000 and 2009, 27% of the labour productivity growth in the United Kingdom was directly attributable to private investment in innovation. Reports have shown that since the mid-1990s investment in creative knowledge(innovation) in countries such as Finland, Denmark, China, France, the Netherlands, Sweden and the United States has grown rapidly and experienced dramatic economic growth (OECD, 2007a).

Despite the new opportunities offered by innovation, firm level innovation in many African countries has seen little improvement in productivity performance over the years. Firm level innovation is a continuous process that brings about new ideas, new products development, pioneering of new technologies and processes as well as the promotion of entrepreneurship. African countries can only be as competitive to the extent of the capacity in stimulating firm-level innovation. In this connection, this paper assesses firm level innovations within the small, medium and large firms in Ghana for the period 2008 to 2010. The paper identified the types of innovations and the critical factors hampering innovation activities in Ghana.

***Categorisation of Firms***

Categorization of firms varies from country to country, depending on one or more thresholds laid down in respect of investment, employment, turnover, legal status and method of production. The categorization of a firm is also dependent on the specific enterprise because some business establishments are a lot more labor intensive and the definition of "small" may include a large number of employees. Other firms, especially those that rely on technology or on specific individual skills, may employ few employees but could be classified as medium, large or very large. Different categorizations have therefore been used to define firm size, however; the commonly used in the literature is the number of employees (Adams & Hall, 1993; Freel, 1999 and Kumar, Rajan & Zingales 2001).

In Ghana, number of employees is the common criterion for classifying firms (Kayanula and Quartey, 2000) though the criterion of level of investment is also considered in some classifications. For instance, the National Board for Small Scale Industries (NBSSI, 1990) categorization for firms applies both the "fixed asset and number of employees" criteria. It defines a micro enterprise or firm as a sole business enterprise with less than five employees, especially consisting of family members or friends. A small-scale enterprise is defined as a firm with not more than nine workers, and has plant and machinery (excluding land, buildings and vehicles) not exceeding GHC10 million. Medium and large firms have 10 to 19 and 20 to 49 employees respectively. According to the Ghana Statistical Service (GSS), firms with less than 10 employees are small while those with more than 10 employees are medium or large-sized enterprises (Kayanula and Quartey 2000). Although, different variables can be used to categorize firm size in innovation surveys, the Oslo Manual from which the ASTII innovation survey drew guidelines, recommends that firm categorization should be measured on the basis of number of employees to ensure cross-country comparability. This paper therefore adopted the Oslo Manual's categorization of firms given as: 10 to 49; 50 to 249; 250 to 499 and 500 and above for small, medium, large and very large firms respectively (OECD/Eurostat, 2005)

***Firm Level Innovation and growth***

Firm level innovation generally refers to renewing, changing or creating more effective or useful processes, products or ways of doing things in a firm's day to day operations. It is a continuous process that brings about new ideas, new product development, and pioneering of new technologies and processes as well as the promotion of entrepreneurship in the industrial sector (Mytelka, 2000). For businesses, this could mean implementing new ideas, creating dynamic products or improving on existing services. Innovation is the creation of value from knowledge and a driver of economic growth if well managed (Gault 2010). The common feature of innovation in the business context is that a change must have been implemented by the firm and introduced on the market (OECD/Eurostat 2005). This means that a firm can innovate at many different points in its development process, including conception, R&D transfer, organization and marketing processes. With fewer people producing the knowledge needed to create value, innovation becomes an impetus for increased productivity leading to rapid economic growth.

Several studies have recognized innovation as the catalyst for industrial growth. Firms need innovations to open up new markets, gain competitive advantage, increase market share and achieve substantial economic growth. For example, innovation efforts embarked upon by firms in Hong Kong, Singapore, South Korea and Taiwan (the Asian Tigers) have led to their industrial growth and sustainable competitiveness (Baek, Yongchun, & Randall 2005). The rate of rapid changes experienced by industries as well as stiff challenges posed by competition and globalization means firms have to innovate to survive global competition. For developing countries, innovation is certainly the key driver of differences in productivity, income variations, business growth and catch-up in industrial competitiveness (Cantwell (2003).

Global understanding of innovation activities and their economic impact has greatly increased over time yet, it is still deficient. As the world economy evolves, so does the process of innovation which is continuously gaining momentum within the context of today's low-growth, resource-constrained world. Strong understanding of customer needs and markets, combined with better access to talent and technologies are rapidly unlocking the success to innovate in many countries (Harary, (2013). However, the ability of a country to innovate largely depends on its technological capabilities, information flow and skills - technical, managerial and institutional arrangements that allow capable researchers to produce new technologies, while at the same time allowing productive firms to access, utilize, and commercialize technology efficiently. For firms in African there is the need to learn and or adapt to new technologies in order to upgrade the quality of their products and processes so as to stand the chance of success in the industrially competitiveness global market economy.

The Ghanaian scientific and innovative landscape has evolved dramatically since independence and successive governments have recognized and shown interest in transforming the economy through demand-driven research and innovations. To achieve these goals, the National Science and Technology (S&T) Policy document of 2000, was revised in 2010 with the inclusion of issues relating to innovation. The objective of Ghana's Science, Technology and Innovation (STI) policy is to lift Ghana to a middle income status by 2020 through the perpetuation of science, technology and innovation at all levels of society (MESTI, 2010). To improve private sector competitiveness domestically and globally, Ghana's Shared Growth and Development Agenda (GSGDA) has also emphasized modern skills and competencies, science, technology

and innovation and technology transfer as one of the key drivers for Ghana's growth and economic transformation (GSGDA, 2010).

Despite the recognition of innovation as the bedrock of a market-driven economy, the level of innovation in Ghanaian firms is not known. There is paucity of research work and information on innovation activities in Ghana and it is difficult or impossible to fully understand firm level competitiveness and factors enhancing or limiting innovation processes in the country. Today, a nation's growth and industrial competitiveness is determined through its innovativeness. The important question to ask therefore is "to what extent are Ghanaian firms engaged in innovation activities?" What factors influence or inhibit innovation activities within the firms in Ghana? These questions attract a lot of attention among business experts, policy makers, academics and investors. Since manufacturing firms in Ghana, like those in other countries, are also part of the larger economic society, and are also driven by intense competitive environment, they need to be continuously innovating to benefit from emerging technologies and the global economy. The focus of this paper therefore is to assess the innovation landscape of firms in Ghana. The paper assessed the extent to which small, medium and large firms in Ghanaian embark on innovation activities. The paper also investigates firm linkages and collaboration for innovation activities, motivation for innovation, effects of innovation and the critical factors hampering innovation activities. The rest of the paper is organized as follows: Section Two presents the analytical framework while the methodology is described in Section Three. Section Four deals with the key results of the study and Section Five conclude and drive some policy implications.

## THEORETICAL PERSPECTIVE

### *Technological capability and learning in firms*

The remarkable technological development and global industrial competitiveness of Taiwan, Korea and Singapore (the Asian Tigers) can be best understood by highlighting their innovative performance (Keller and Samuels, 2003). The analytical framework for this paper therefore highlights the alternative generic evolutionary paths for rapid industrial and technological catch-up by the "Asian Tigers" and the late-industrializing countries in general. The framework conceptualizes that firm's accumulation of production knowledge from different sources including but not limited to skill training; firm level research and development (R&D); linkages with external R&D institutions; acquisition of machinery and equipment, indeed translates into quality products, efficiency, increased productivity and industrial competitiveness.

Firms require skills, knowledge and experience to innovate. The process by which firms accumulate and form new capabilities is referred to as technological learning. However, there are different modes of learning, namely: 'learning by imitation', (Lee and Kim, 2010), 'learning to learn' (Stiglitz, 1987), and accumulation of technological capabilities for innovative activities. The framework is synthesized from integrating three theoretical perspectives: The resource-based view of the firm, the innovation network perspective on technological learning process, and the institutional economics perspective (Fagerberg & Godindo 2004). The emphasis therefore, is on systemic and continuous processes through investment, adoption, modification and diffusion of new technologies, rather than taking R&D as the starting point of innovation. African countries, given this definition of innovation process, can be seen simply as following in

the path of the late industrializers. The paper suggests that the analytical framework is applicable in explaining the technological development experience of other late-industrializing countries like Ghana.

***Firm innovative capability in context***

Technological capability is the knowledge and skills required for firms to choose, install, operate, maintain, adapt, improve and develop technologies (Romijn and Albaladejo, 2004). A key factor of innovation is the firm's ability to develop technological capacity which intern depends on the existing knowledge of the firm (Cohen and Leviathan (1990). The need to acquire this capability necessitates learning, acquiring and transferring knowledge, as well as at modifying firm behaviour to reflect new knowledge and insights (Garvin, 1993). In small firms, a substantial part of the learning may not take the form of well-defined R&D programmes and other formalised 'technological effort'; but informal and incremental problem solving and experimentation within the firm, which are closely associated with production, organization and marketing (Romijn, 1999).

Several kinds of technological capability are distinguished in the literature. But for the purpose of this paper, the focus is on the innovation capability; which refers to the ability to make minor or major improvements and modifications to existing technologies, and to create new technologies leading to new products, processes, organisations and or marketing strategies (Romijn and Albaladejo, 2004). Innovation in this context is presumed to contribute to dynamic competitive advantage of the firm since it enhances the dynamism of keeping up with, responding to, and initiating technological changes (Romijn and Albaladejo, 2004; Abereijo et al., (2007). Many internal and external factors available to the firm may contribute to innovation capability. Internal factors such as the entrepreneur (s) and workforce constitute the stock of initial experience, knowledge and skills within the firm. Over time, the capability base of the firm is further enhanced through internal learning, involving investments in formal R&D, experimentations, making minor adaptations to products, processes and organisations and in-house staff training. Interaction with suppliers, customers, public institutions and firm collaboration and networking is also established to provide missing inputs into the learning process, which the firm itself cannot easily provide. This interaction may take place for the purpose of gathering information about technologies and markets, as well as for obtaining other inputs to complement the internal learning process (Lundvall, 1988). All these factors and processes complement each other to enhance the innovative capacity of firms. Thus, the greater the technological opportunity, the bigger the incentive for firms to invest in R&D and innovate.

## METHODOLOGY

The paper used data from the second phase of the African Science, Technology and Innovation Indicator (ASTII) survey conducted in Ghana in 2012. The ASTII survey is an African initiative that aims at making available a body of up-to-date data and information to policy-makers, politicians, businesses and other stakeholders so that they can inform policies on science, technology and innovation. The survey was sponsored by Swedish International Agency (Sida) through the NEPAD Agency and participating African countries. Data was collected on common

STI indicators as benchmarks to measure the development of science, technology and innovation in African countries and for international comparability.

The up-dated list of the Association of Ghana Industries (AGI) was used as the sampling frame. Purposive sampling was used to select a sample of 500 small, medium and large firms across the country from firms employing more than 10 people. Purposive sampling was used to select small, medium and large firms in the manufacturing and service sectors for interview. Manufacturing firms include those engaged in food processing, beverages, furniture and pharmaceutical products while the service firms consisted of financial institutions, electricity and water providers, ICT services, engineering/electrician works, and artisanal works. A standardized structured questionnaire prepared by NEPAD with guidelines from the Oslo Manual was the main data collection instrument. Although the questionnaire was standardized, it was pre-tested to determine its understanding, relevance and clarity among the fieldworkers to ensure that the data collection followed a uniform pattern.

Data was captured by double data entry using the CSpro programme. The data was processed and analyzed using SPSS version 16 to generate descriptive results. The unit of analysis was the entrepreneur. Challenges include managing cases of non-response such as firm's turnover and employee academic qualification. For many of the firms, such information was sourced from secondary sources like Annual Reports while follow-up were made on others to clarify these challenges. These efforts helped to a large extent to ensure the integrity and reliability of the data collected. The response rate was 62%.

## Section Four: Results and Discussions

### *Characteristics of firms and indication for innovation*

A total of 309 firms were covered in the survey. Out of this, 62% were manufacturing while 38% were in the service sector. About 72% of the firms were engaged in some aspects of innovation but 28% were not. Out of the innovation firms, 64% belong to the manufacturing category while 36% were service firms. For the non-innovative firms, about 56% were manufacturing while 44% were service sector firms as shown in Table 1. The indication is that innovation in Ghana is more prevalent in the manufacturing sector than the service sector.

**Table 1: Firms by type of activity and innovation status**

| Type of activity | Innovative firms (%) | Non innovative firms (%) | Percentage |
|---|---|---|---|
| Manufacturing | 63.8 | 56.5 | 61.8 |
| Services | 36.2 | 43.5 | 38.2 |
| Total | 100 | 100 | 100.0 |

Source NEPAD/STEPRI, 2012

### *Firm size and innovation activity*

About 30% of the innovative firms were small, 17.2% were medium, 18.4% were large and 6.5% were very large firms. This finding is similar to Zoltan and Audretsch (1990) observation that small firms perform more innovative activities than large firms which usually acquire technologies rather than innovating. Chesbrough (2010) posit that the critical innovation

challenge for small firms is lack of capacity to both seek and absorb external knowledge. Despite these difficulties, recent empirical evidence suggests that many small firms engage in innovation activities (Brunswicker & Vanhaverbeke 2011), and that the prevalence of innovation among small firms has increased in recent years (van der Vrande et al. 2009). Vahter, Love and Roper (2012) have also noted that innovation performance is stronger for small firms than for larger firms. The authors observed that for small firms with 10-49 employees external linkages account for about 40 percent of innovative sales compared to about 25% in larger firms. This suggests that any attempt to encourage innovation in Ghana would have to focus on the small firms.

***Employment and turnover capacity of innovative and non-innovative firms***

Ghanaian firms that engaged in innovation activities employed more people compared to non-innovative firms. This study found out that employment capacity of innovative firms was higher than the non-innovative firms. There was however, a significant increase in employment for non-innovative firms in 2010. The reason for the decrease in employment for the innovative firms in 2010 may be of interest for further research.

Turnover for the innovative firms' accounted for about 98% and 96% of the total turnover of the firms in 2008 and 2010 compared to 2% and 4% of the non-innovative firms respectively (see Table 2). Innovation improves product or service quality and enhances entry into new markets. The high turnover for the innovation firms suggests that such firms were able to improve on their products and processes and were also able to access new markets. It is also possible that the sampling may have an effect on the result since turnover is highly correlated to firm size.

**Table 2: Turnover of Innovative and non-innovative firms**

| Type of firm | Turnover (%) 2008 | Turnover (%) 2010 |
|---|---|---|
| Innovation firms | 97.8 | 96.2 |
| No Innovation firms | 2.2 | 3.8 |
| Total | 100 | 100 |

Source NEPAD/STEPRI, 2012

***Employees with university degrees***

The innovative capacity of a firm partly depends on the level of production and technology managerial competency, creativity and the technical experience of its workforce. One may presume that a firm is able to learn, innovate faster and adjust to market demands when its employees are highly skilled or well educated. High education in this sense refers to employees with university degrees. Figure 1 show that 77% of the employees in the innovative firms had university degrees compared to 23% university degree holders employed by the non-innovative firms. The study also noted that most of the employees with university degrees were employed by large multinational firms and the medium firms that are part of large groups. Since most of the employees with university degrees were employed by large and medium firms, it was not clear why the small firms performed most of the innovations. This is an area of further research in Ghana. However the observation made in the study concerning innovation in small firms with less degree holders conforms to the understanding of innovation from the systemic perspective. Innovation is the contributive effort of critical actors and not necessarily the sole effort of single categories of workers such as "degree-holders". In that sense, it is possible to expect innovative

efforts from the factory-floor labourer the same way as to expect from the manager or engineer with higher education.

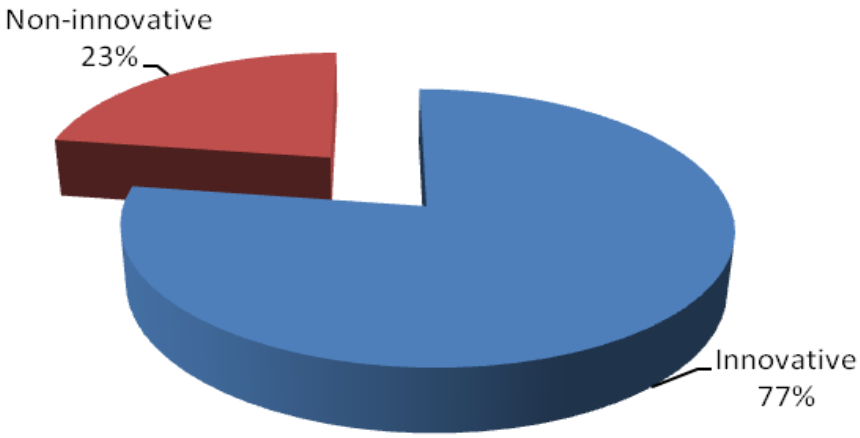


**Figure 1: Percentage of employees with university degrees**
Source NEPAD/STEPRI, 2012

***Process and Product Innovations***

A product (goods and services) innovation is the introduction to market of a new or significantly improved good or service with respect to its capabilities, such as improved user-friendliness, components, software or sub-systems. On the other hand, process innovation is the use or implementation of new or significantly improved process or method for the production or distribution of goods and services (OECD/Eurostat, 2005).

As to be expected, process innovations were more pronounced within the service sector firms compared to the manufacturing firms. For example, in Table 3, going by the three identifiable categories of process innovation in the sample, an average of 66% of the firms introduced process innovation. About 70% of the firms introduced new or significantly improved supporting activities for processes such as maintenance. About 66% introduced new or significantly improved logistics, delivery or distribution methods or services. Then about 63% of the firms also performed improved methods of manufacturing goods. This suggests that service sector firms in Ghana perform more process innovation compared to manufacturing firms. However the point remains that process innovation abounds in the key sectors of industry and services.

**Table 3: Process innovation**

| Process innovation | Percentage |
|---|---|
| Introduced new goods significantly improved methods of manufacturing or producing goods | 62.9 |
| Introduced new or significantly improved logistics, delivery or distribution methods or services | 65.6 |
| Introduced new or significantly improved supporting activities for processes such as maintenance etc. | 70.1 |

Source NEPAD/STEPRI, 2012

In Figure 2, about 59% of the processed innovations were developed within the firms themselves while almost 21% were developed by the firms in collaborations with other firms. Only 11% the innovative firms adapted or modified their original product or services.

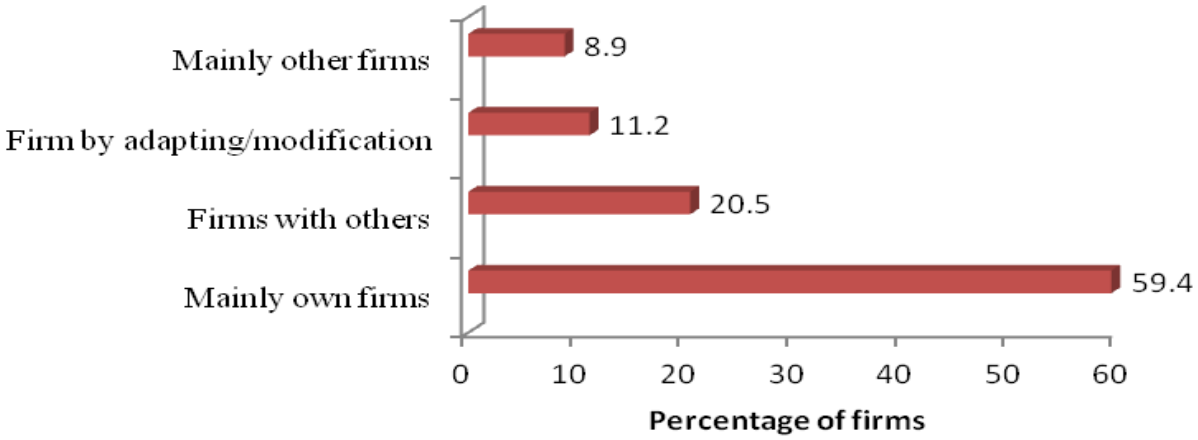


**Figure 2: Development of process innovations**
Source: Source NEPAD/STEPRI, 2012

With regard to product innovation, 63% of the firms introduced new or significantly improved goods while 62% performed new or significantly improved services. The study found out that most of the products innovation occurred within the small firms. Generally the innovations coming from the small firms were incremental or modification of existing products or processes rather than developing completely new ones.

The infusion of advanced technology in small firms evolves through relatively long periods of incremental change punctuated by relatively rare innovations that radically improve the state of the art. The study noted that most innovations in the small firms simply build on what is already there but requiring modifications to existing functions and practices. The broad categories of innovation that were identified as incremental were procedural (management determined innovations in rules and procedures); personnel-related (innovations in selection and training policies, and in human resource management practices); process (new methods of production or manufacturing); and structural (innovative modifications to equipment and facilities and new ways in which work units are structured). This is understandable given the fact that many small

firms in Ghana lack the requisite skills, manpower, technology, machinery/ equipment to produce or manufacture completely new products and manufacturing processes.

***Origin of the innovations***

For any developing country, the use of local capacity in manufacturing and processing is a key factor for entering into the global industrial competition. According to Liu et al. (2011); using local knowledge to innovate ultimately provides the foundation for attaining and sustaining high standards of living. Figure 3 shows that 66% of the innovations were developed within the country while 34% originated from abroad. This is quite encouraging, given that local knowedge in Ghana is transforming into firm level innovation activities. However, it is important for the firms using local capacity for innovations to structure what Lazonick and Mazzucato (2012) called the "risk-reward nexus" in their innovation process to ensure that local innovation indeed results in competitiveness and sustainable development. This means that local capacity for firm level innovation should be geared towards demand-driven goods and services as well as identifying key technology areas for breakthroughs that focus particularly on catching up with the developed nations.

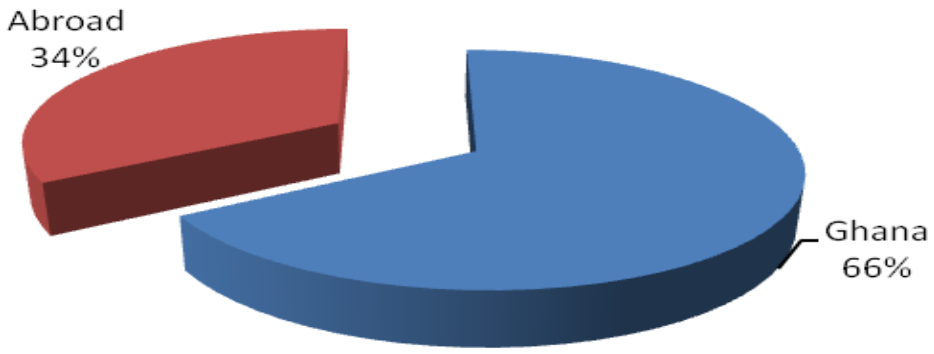


**Figure 3: Origin of firm level innovations**
Source: NEPAD/STEPRI, 2012

***Collaboration for innovation activities***

In Figure 4, only about 3% of the firms collaborated with R&D institutions for innovation purposes and much less with universities and institutions of higher education. It was almost as if collaboration between research institutions or and firms was non-existent. The majority of the sampled firms (66%) did not indicate their collaborators for innovation. However, the firms that indicated collaboration singled out feedback information from clients and customers as influencing the innovation activities within the firms (Figure 4). Linkages to open information, acquisition of technology and collaboration for innovation activities are crucial ingredients to the innovation process. Innovation cooperation and collaboration also involve active participation in joint projects with other organizations. Collaborative innovation provides great potential for synergies as partners learn and adopt best practices from each other to speed-up their innovation activities. Therefore, it is important for Ghanaian firms to collaborate with the identifiable

critical actors. The limited collaboration between the R&D institutions or the knowledge centres is an issue of concern. Such collaboration has the potential to broaden the firms' innovative horizon.

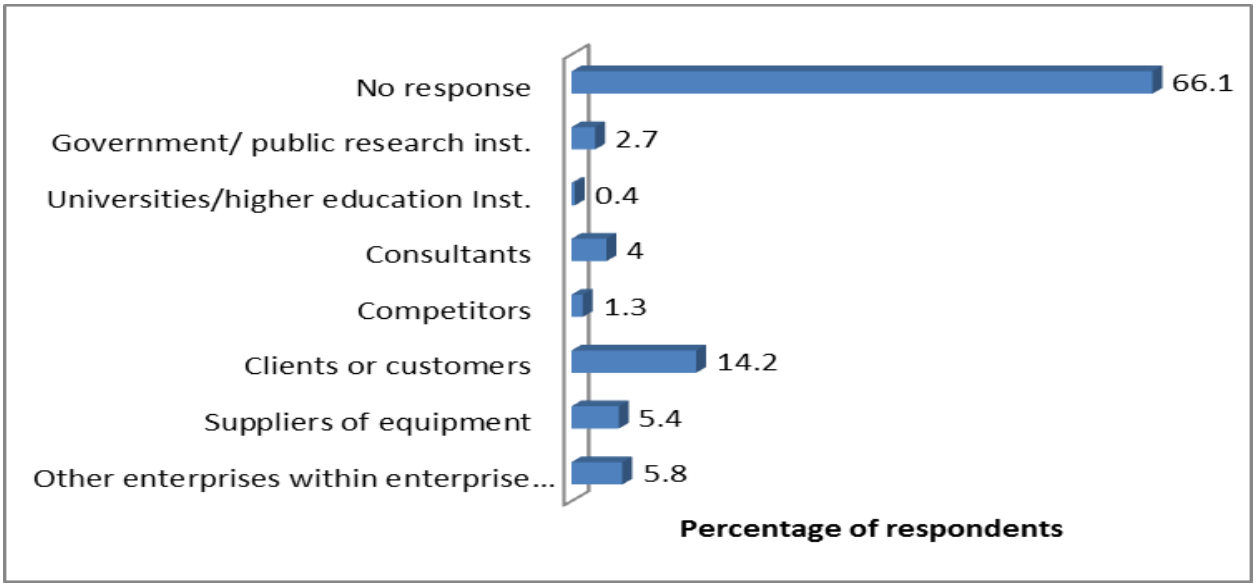


**Figure 4: Collaborators for innovation**
Source: NEPAD/STEPRI, 2012

***Organizational and marketing innovations***

Organizational innovation involves business practices, decision making and external relations while marketing innovations on the other hand are changes to aesthetic design or packaging; media or new techniques for product promotion, placement or sales channels and new methods of pricing (OECD, 2005). Asked about whether they performed organizational or marketing innovations, most of the innovation firms (81%) indicated that they performed organizational innovation while 65 % introduced marketing innovations. The organizational innovations the firms claimed to have introduced included improved decision-making processes in relation to work responsibility, business practice and external relations while the marketing innovations were significant changes to aesthetic design, improved product packaging, new mass media techniques, new pricing techniques and new sales channels. As indicated above, most of the innovative firms were small in size and did not significantly improve on the state-of-the-art but simply build on what is already there.

***Most important and performed innovation activities***

Figure 5 shows the important and most performed innovation activities carried out by the firm. According to the Figure, 80% of the innovative firms undertook in-house training to build and enhance their human resource capacity. About 76% of the innovative firms acquired new machinery, equipment and hardware while 66% developed new designs and about 60% accessed new markets. Continuously performed intramural R&D was the least performed innovation activity (see Figure 5). Since R&D is expensive and many small firms in Ghana lack the capacity to employ and retain highly qualified and experienced R&D personnel, it is not surprising that most of the firms were not able to perform continuous R&D.

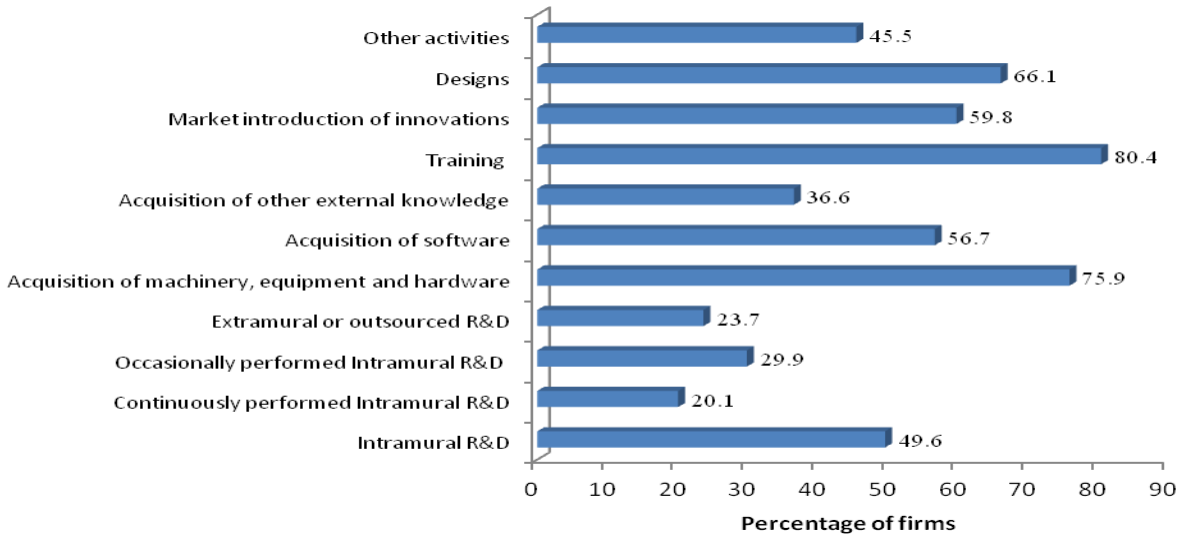


**Figure 5: Most important and performed innovation activities**
Source: Source NEPAD/STEPRI, 2012

***Motivation for innovation***

The study solicited from the entrepreneurs the factors that motivate their innovations. Figure 6, shows that, improvement of goods and services and increasing the range of goods and services had motivated 64% and 52% of the innovation firms respectively to initiate innovative activities. Other motivation factors for innovation include increase in market share, entry into new markets, improvement in health and safety, and capacity building in production processes. This is against the backdrop that most firms in Ghana are driven primarily by the urge for profit and survival rather than competing in the global market. However, the goals of innovation are multi-faceted. Thus even though the aim is to improve the quality of goods and services, it is linked to the goal of increasing market share and entering new markets and some others listed in Figure 6.


**Figure 6: Factors rated "very important" as reasons for innovation**
Source: Source NEPAD/STEPRI, 2012

***Effects of innovation***

Asked to qualitatively assess the benefits they derived as a result of their innovation activities, about 64% of the innovative firms indicated improvement in the quality of goods and services while more than half increased the range of their goods and services. Besides, 39% and 38% of the firms increased the capacity of their production and met government regulatory requirements respectively (see Figure 7). These findings echo the findings of the motivation for innovation. Understandably, the effects of innovation are tied to the motivation and what firms aim at to achieve in their innovation effort, they achieve.

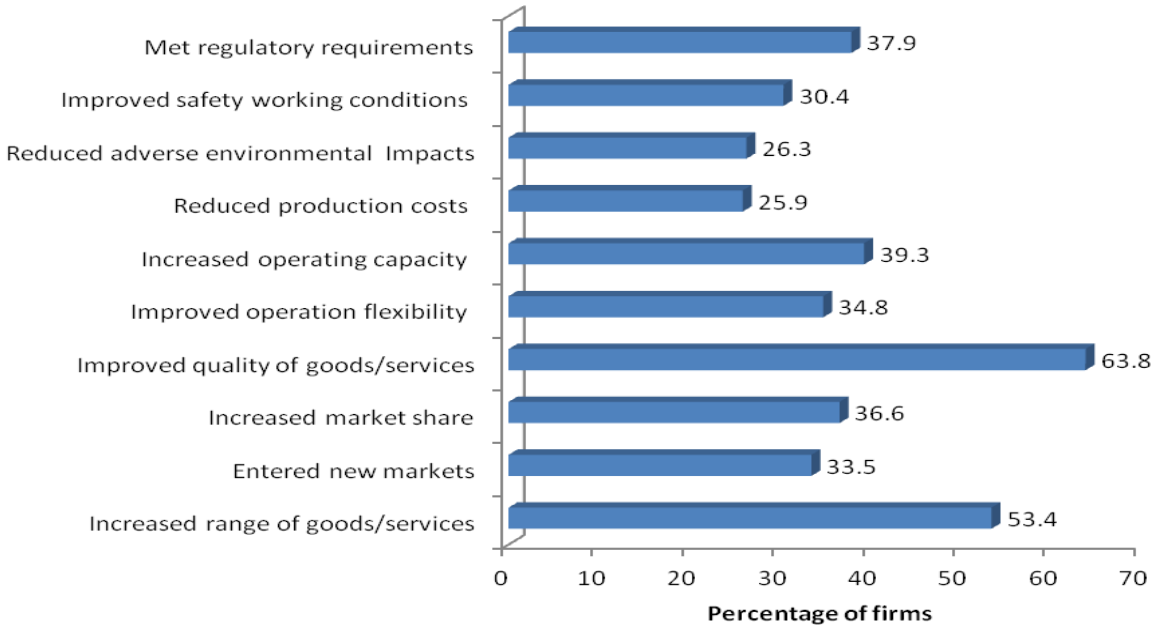


**Figure 7: Effects of innovation**

Source: Source NEPAD/STEPRI, 2012

***Factors hampering innovation activities***

Concerning factors hampering the innovativeness of the firms, lack of finance ranked highest. This was followed by high cost for innovation, lack of qualified personnel and lack of information on technology in that order. Other obstacles mentioned include the domination of the local market by well-established multinational firms, difficulties in finding innovation partners and perceived economic risks. The study also found out that 39% of the firms had their innovation activities seriously delayed, while 31% abandoned their innovations after the activity or project has begun. About 30% of the firms abandoned their innovations at the concept stage due to lack of funds (see Figure 8).

In order to improve firm level innovation in Ghana, there is the need for a government-backed credit guarantee scheme easily accessible to growth and innovation oriented firms to reduce their lending risks. In addition, it is important to encourage and strengthen firm level associations to provide opportunities for their members to continuously learn about new technology developments and opportunities. Meanwhile, further studies to unearth why many Ghanaian firms abandoned their innovation activities before completion are important.

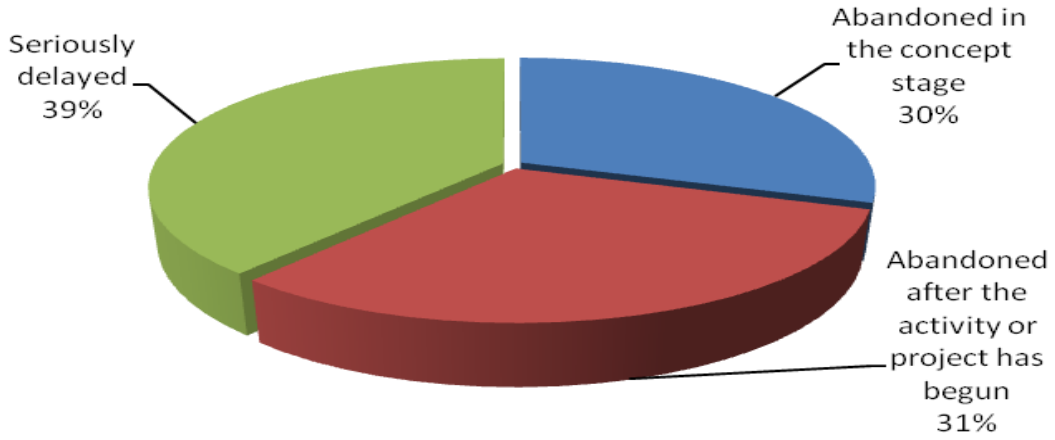


**Figure 8: Innovation constraints**
Source: Source NEPAD/STEPRI, 2012

***Intellectual property rights***

The current global economic crisis is focusing renewed attention on the urgent need to incentivize and protect innovation to both solve the world's most challenging problems and to generate jobs and economic growth. Intellectual Property (IP), which refers to everything from inventions to the creative arts, drives innovation. IP encourages innovation and rewards entrepreneurs, drives economic growth and competitiveness, creates and supports competitive jobs, protects consumers and families, and helps generate breakthrough solutions to global challenges. This study revealed a low incidence of the use of intellectual property right (IPR) to protect innovations introduced in Ghana. Only 24% of the firms had registered a trademark. About 23 applied for a patent while 19% registered an industrial design. The least type of IPR used by Ghanaian firms was applying for a patent outside Ghana (see Figure 9). In this regard, the need for flexible IPR registration procedures in Ghana cannot be overemphasized.

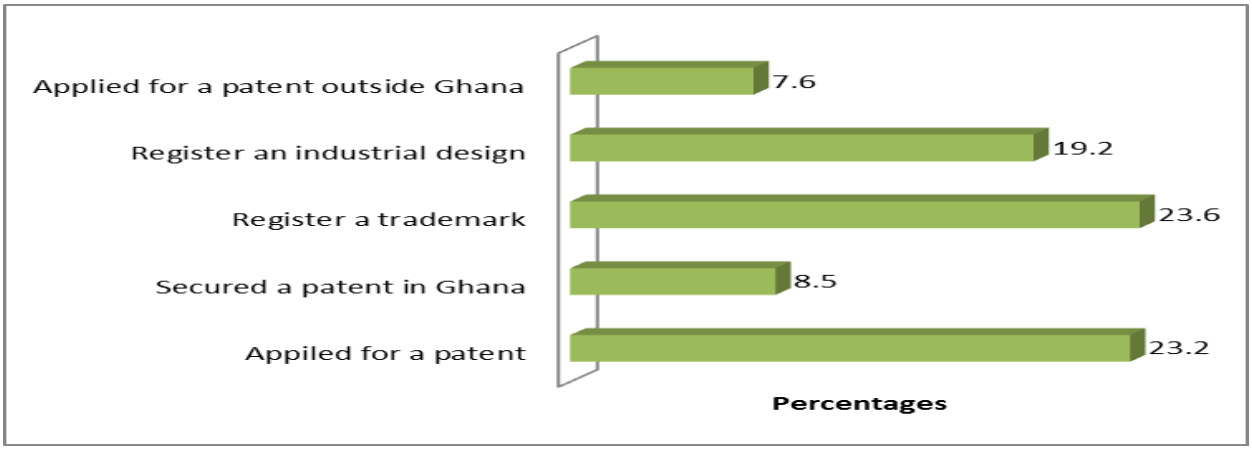


**Figure 9: Intellectual Property Rights**
Source: Source NEPAD/STEPRI, 2012

***Government financial support to firms for innovative activities***

Government financial support to firms to undertake R&D activities is either non-existence or woefully inadequate. For instance, this study found out that the highest percentage share of R&D expenditure Ghanaian firms received from national funding agencies was only 6% while Municipal, District Assemblies and other government authorities provided less than 2% of R&D expenditure to firms in Ghana (see Figure 10). This revelation further buttresses the earlier point made that, government needs to establish an innovation fund for growth and innovation-oriented firm in Ghana.

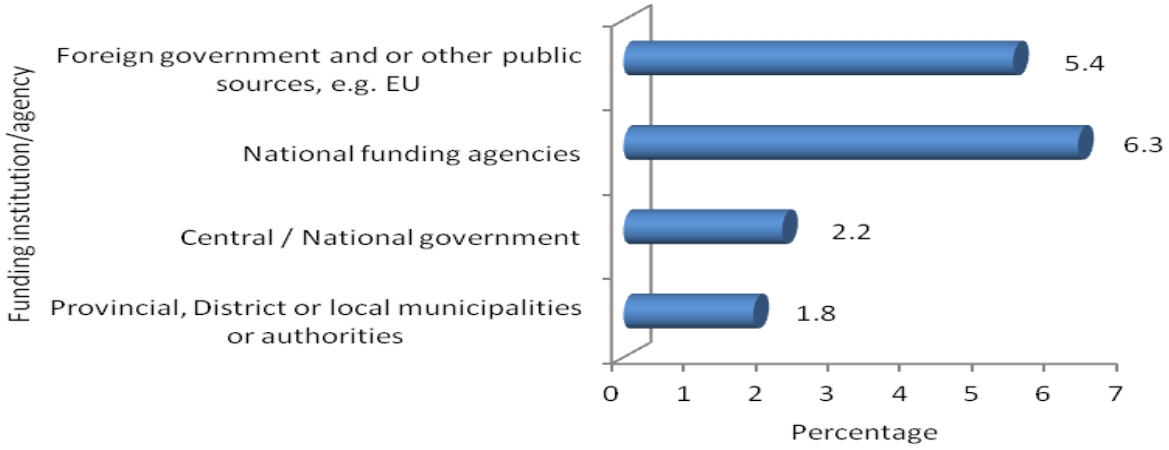


**Figure 10: Sources of support for innovation (% of R&D expenditure)**
Source: Source NEPAD/STEPRI, 2012

## CONCLUSION

The results of this study have underscored the prevalence of innovation in Ghanaian firms. That 72% of the sample has produced some innovation of a kind is significant. Altogether the characteristics of these innovations illustrate what is generally known about innovation. For example, the innovations are largely incremental and basically tailored to address specific needs. Nonetheless, these are important innovations that enable the firms to address competitive pressures. There is also the systemic characteristic of innovation. Firms' innovations happen as a result of interactions with identifiable critical actors in the innovation system – other entrepreneurs, customers, suppliers, researchers and others. It implies that innovation in the national context is promotable and that forging interaction among the key stakeholders will enhance innovation.

In Ghana, there have been efforts at stimulating innovation in various ways. For example, efforts have been aimed at providing training and business development services for MSMEs; enhancing access to affordable credit and making available appropriate but cost-effective technology to improve firm level productivity as enshrined in Ghana Shared Growth and Development Agenda (GSGDA), 2010-2013. There is also the institutional support (in the Ghana Export Promotion Authority for the private sector to take advantage of the opportunities that

abound in the domestic, regional, and global markets. However, this study has shown that more efforts need to be done nationally, to enhance innovation in Ghana

The study has highlighted the range of factors, both internal and external that inhibits the innovative capacities and abilities of firm level innovations in Ghana. Among the internal factors were the lower academic education, lack of funding, low level of technology and managerial skills and dominance of the market by very large and multinational firms with quality products which have their origin from abroad. In addition to these internal factors, the extent of firm investment in R&D and training of employees are also inadequate. Therefore improving indigenous knowledge, creativity, entrepreneurial or managerial experiences are condition for achieving innovativeness and firm level competitiveness in Ghana. For the small firms, collaboration with R&D institutions as well as inter-firm linkage for best practice are good breeding grounds for improvement in innovation activities. Similarly, the importance of technological improvement, through the R&D efforts and on-the-job learning, is equally essential for increasing technological capabilities at the firm level.

**Policy recommendations**

Consequent to the above, some important policy issues are necessary for the Ghanaian government, at all levels, especially in her efforts at promoting and developing micro, small and medium enterprises (MSMEs) within the private sector. We propose the following policy recommendations:

- There should be strategic training modules for the owners of the small firms in Ghana so as to increase their absorption capacity for innovation.
- Small business associations should be strengthened to provide opportunities for their members to continuously learn about new technology developments and opportunities.
- Finally, there should be a government-backed credit guarantee scheme to reduce the lending risk of new and early-stage innovative enterprises.

## REFERENCES

Abereijo, Isaac Oluwajoba, Ilori, Matthew Oluwagbemiga, Taiwo, Kehinde.A. and Adegbite Stephen Akinade (2007) Assessment of the capabilities for innovation by small and medium industry in Nigeri. *African Journal of Business Management* Vol.1 (8), pp. 209-217, Available online at http://www.academicjournals.org/AJBM

Afful, K. N. (2002). Technology - The missing link in Ghana development efforts. The Oguaa Journal of Social Science, 3, 12 – 28.

Baek, Yongchun, and Randall S. Jones. 2005. "Sustaining High Growth through Innovation: Reforming the R&D and Education System in Korea." OECD Economics Department Working Paper 470, OECD, Paris.

Bolton, J. E. (1971). "*Report of the Committee of Inquiry on Small Firms"*, HMSO, London

British Innovation Survey, (2001). (2001) 'Innovation and Research Strategy for Growth' Economic Paper No.15 pp.21

Cantwell (2003). "Innovation, Competitiveness, and Growth." In *Handbook of Innovation*, ed. Jan Fargerberg, David C. Mowery, and Richard R. Nelson, ch. 21. Oxford: Oxford University Press.

Carsamer, E. (2009). *Access To Credit by SMEs in Ghana:Does the type of business matter? Social Science Today*. Winneba: Jim Waler Light and Salt Publishers.

Cohen, W.M. and Levinthal, D.A. (1990): "Absorptive-capacity – A new perspective on learning and innovation", *Administrative Science Quarterly*, 35 (1), 128–152.

Crépon,

Criscuolo, C. and Haskel, J., (2003), "Innovations and Productivity Growth in the UK: Evidence from CIS2 and CIS3",Working Paper.

Diederen, B. Mohnen, P. and Palm, F., (2005), "Innovation in Enterprise Clusters: Evidence from Dutch Manufacturing", Working Paper.

Kayanula D. and Quartey, P. (2000). The Policy Environment for Promoting Small and Medium Sized Enterprise in Ghana and Malawi. *Finance and Development Research Programme Working Paper* . Series No.15.

Kleinknecht, A., and Mohnen, P., 2002, "Innovation and Firm Performance: Econometric Explorations of Survey Data", Basingstoke, UK: Palgrave.

Kumar, K.B. and R.G. Rajan and L. Zingales (2001), "What Determines Firm Size?", *Working paper*, University of Chicago.

Lazonick, William, and Mariana Mazzucato 2012, "The Risk-Reward Nexus in the Innovation Process," theAIRnet working paper, March.

Li, Yin, 2011, "From Classic Failures to Global Competitors: Business Organization and Economic Development in the Chinese Semiconductor Industry", Master Thesis, University of Massachusetts Lowell.

Love J. H., Roper S. and Vahter P. (2012). Learning from Open Innovation. CSME Working Paper No. 112, Warwick Business School.

NBSSI (1990), "Supporting Micro &Small Scale Enterprises". *A handbook on Enterprise Development Part 1*. NBSSI, Print Solutions, Accra.

Osei B, Baah-Nuakoh A, Tutu K.A, & Sowa N.K (1993), `*Impact of Structural Adjustment on Small-Scale Enterprises in Ghana.*

Dinye, R. D (1991). *Potentials of small Scale Industry Development in Rural Ghana*. Dortmund Germany: university of Dortmund.

Dahlman,C.J.(1994), "Technology strategy in East Asian Developing Economies",

*Journal of Asian Economics*, 5(Winter): 541-72

Ekpenyong,D.B. and Nyong, M. O (1992). *Small amd Medium Scale Enterprises in Nigeria:The Characteristics,Problems and Sources of Finance*. Kenya: Zakuma Printers Ltd,Nairobi .

Gavin DA (1993). Building a learning organization. Harvard Business Review. July – August, 78 – 91

Goldsmith, R.E. and Foxall, R. G. (2003). The Measurement of Innovativeness. In: Shavinina, al. V. (Ed.), *The International Handbook on Innovation*. Oxford: Elsevier Science

Fagerberg, J. and Godindo, M. M. (2004), Catching-up and Innovation, In Fagerberg, J., Mowery, D. and Nelson, R. R. (Ed.), *The Oxford Handbook of Innovation*, Oxford: Oxford

University Press.

Harary, A. (2013). Global Innovation barometer. Global Research Findings and Insights. January 2013. http://www.ge.com/sites/default/files/Innovation_Overview.pdf. 22/10/13

Keller, W. W. and Samuels, R. J. (2003), Innovation and Asian Economies, In Keller, W. W. and Samuels, R. J. (Ed.), *Crisis and Innovation in Asian Technology*, Cambridge: Cambridge University Press, pp. 1-22

Lundvall BA (1988). Innovation as an interactive process: from user producer interaction to the national system of innovation, in: Dosi, G, Freeman, C, Nelson, R, Silverberg, G and Soete, L (Eds.), Technical change and Economic Theory. Pinter Publishers, London, pp. 349-369

Lundvall, B-A. (Ed.) (1992), *National Innovation Systems: Towards a Theory of Innovation and Interactive Learning*, London: Pinter..

Mazart, Genevieve (1999). Description of National Innovation Surveys Carried Out, or Foreseen, in 1997-99 in OECD Non_CIS-2 Participants and NESTI Observer Countries. *STI Working Paper Series* 1999/1, Paris: OECD

Mokyr, Joel (2002). The Gift of Historical origins of the Knowledge Economy, Princeton, N. J.: Princeton University Press.

Mytelka, L. (2000). Local Systems of Innovation in a Globalized World Economy in Industry and Innovation. Vol. 7, No. 1, June, pp. 33-54.

Nestal (2009). National Endowment for Science Technology and the Arts. UK innovation index: Productivity and Growth in the UK industries pp.5

OECD (2005). Proposed Guidelines for Collecting and Interpreting Technological Innovation Data: Oslo Manual. 3rd ed. Paris: OECD.

OECD (2005c) Science, Technology and Industry Scoreboard 2005.

OECD (2007a) Creating Value from Intellectual Assets, Policy Brief, February.

Oyelaran-Oyeyinka, Banji, (2002). Manufacturing response in a national system of innovation: evidence from the brewing firms in Nigeria. Discussion Paper Series of The United Nations University, Institute of New Technologies (INTECH). Available online at http://www.intech.unu.edu. Accessed on 10/12/2013

Romijn Henry (1999). Acquisition of technological capability in small firms in developing countries. Macmillan, London.

Romijn Henry, Albaladejo Manuel (2004). Determinants of innovation capability in small UK firms: an empirical analysis. Queen Elizabeth Working Paper Series No. 40. Available online at http://www.qeh.ox.ac.uk. Accessed on 10/12/2013 .

Vernon Raymond (1966), "International Investment and International Trade in the Product Cycle," *Quarterly Journal of Economics*, 80 (May), 190-207.

Zoltan J. Acs and David B. Audetsch (1999). Innovation and Small Firms. Cambridge, Mass,: The MIT Press. 1990, xii, p. 212

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