

Entrepreneurship and innovation in Ghana: enterprising Africa

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Abstract This study adopts a multi-level theoretical framework to examine data from 496 entrepreneurs in Ghana. Seven types of innovation activity are analysed against three categories of variables: the characteristics of the entrepreneur, the internal competencies of the firm, and firm location. Across all respondents, the incidence of incremental innovation was far greater than novel innovation. The extent of innovation was related to the education level of the entrepreneur. Firm size and involvement in exporting were positively related to innovation, but firm growth is less systematically so. Innovation was greater in firms located in conurbations compared to firms located in large and small towns. We conclude with suggestions for policy to promote entrepreneurship and innovation in Ghana.

Keywords Entrepreneurship · Innovation · Ghana

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1 Introduction

In the first few years of the 21st century, the attention of the world has been drawn repeatedly to the enduring development crisis in continents from Africa to Asia. As government policies to promote entrepreneurship and innovation become a mainstay in developed countries, their relative economic prosperity perpetuates the gap between them and developing countries. The potential benefits from entrepreneurship and innovation for developing countries are enormous. To this end most of the countries in sub-Saharan Africa champion the development of small- and medium-sized enterprises (SMEs) as a conduit to the alleviation of poverty, the generation of employment, and the promotion of national economic development [Small and Medium Industries Development Organisation (SMIDO) 2004; Chipika and Wilson 2006]. The importance of entrepreneurship in Africa is reflected in the increasing amount of research in this area (see McDade and Spring 2005 for a review); however, a focus on innovation has not been found to date. Our paper aims to contribute to this expanding, yet uncomprehensive knowledge base by analysing data directly gathered from 496 entrepreneurs in Ghana. We examine the extent to which seven types of innovation activity are related to the characteristics of the entrepreneur, the internal competencies of the firm, and the environment of the firm.

In developed countries, the importance of small, entrepreneurial firms rests in their contribution to

employment (Birch 1979), innovation, and competitiveness (Porter 1990; Schumpeter 1942). Innovation is commonly perceived as a key factor in stimulating small firm development (Mahemba and De Bruijn 2003) and business success (Rogers 2004; Hausman 2005). In support of this, governments have endorsed the role of innovation in policies designed to create an enabling environment for entrepreneurship, new venture creation, and firm growth. In developing countries, enterprise creation is a vital element in economic development (Kennedy 1980; Drucker 1995). Although small firms have low market influence individually (Dickson et al. 1997), collectively they have the potential to contribute to national wealth and generate economic growth. The majority of data concerning innovation have been gathered from firms in developed countries (Hadjimanolis 2000), and “the relevance of the innovation process in firms doing business in developing countries is not always properly acknowledged” (Chudnovsky et al. 2006, p. 267). The potential of entrepreneurship to enhance economic development has been recognised (OECD 2003), particularly in developing countries (Mahemba and De Bruijn 2003) who are not large players in world trade. An innovative and thriving SME sector offers the potential for a country to generate employment, develop its domestic economy, and engage in international trade. Whilst it might be argued that developing countries ought to concentrate on ensuring the provision of basic services to their own people, Hipkin and Bennett (2003) propose that adequate economic growth is unlikely to be achieved solely from domestic demand. The sale of innovative goods and services in export markets generates foreign exchange that can then be further used to enhance domestic development, creating a virtuous cycle of trade and development.

The existing body of knowledge on the determinants of innovation has identified many factors associated with innovation; however, few studies have been conclusive. For example, some studies have found firm level competencies to be related to innovation (Fritsch 2004; Fritsch and Franke 2004), whereas other studies have not (Rondé and Hussler 2005). Most previous research has focused on manufacturing firms in developed nations, although service sector firms have been studied in both developed and developing nations. Studies of innovation in firms in primary industries are few (Oyelaran-Oyeyinka et al. 1996; Clark 2002); however, this is a serious omission

given the importance of primary industries in developing countries. Also, much of the existing research has examined product innovations and neglected ideological innovations such as new management practices (Hausman 2005; Rogers 1995).

Our paper expands our knowledge of entrepreneurship and innovation in three ways. Our study of entrepreneurs and their firms in Ghana joins a small body of research based in sub-Saharan Africa. Secondly, our data are gathered from a cross section of firms in primary, secondary, and tertiary industries and thus provide a holistic account of innovative activity. Finally, our analysis of the characteristics of the entrepreneurs, their firm, and its location offers a detailed, multi-level analysis of firm-level innovation. The paper is structured as follows. Section 2 outlines the theoretical framework that underpins our research. Section 3 discusses the Ghanaian context of entrepreneurship and innovation. Section 4 explains the methodology of the study, and the results are presented in Sect. 5. The paper concludes with a discussion of the results and recommendations for policy development.

2 Theoretical framework

In order to create a holistic account of entrepreneurship and innovation in Ghana, our study adopted a multi-level theoretical framework. As the field of entrepreneurship research matures, multi-level theoretical frameworks are likely to become more appropriate as they have the capacity to reflect the complexity of the entrepreneurial process. Recently, Hadjimanolis (2000) considered theories relating to entrepreneurship, the Resource-Based View (RBV) of the firm, and the environmental approach to strategy to investigate innovation in small firms in Cyprus. This approach revealed that innovation was influenced by a combination of internal variables and external factors, e.g., expenditure on research and development (R&D), strategy, use of technological information sources, and co-operation with technology providers. We have adopted a similar three-level approach to investigate entrepreneurship and innovation in Ghana.

2.1 Entrepreneurship

At the heart of entrepreneurship are the entrepreneurs responsible for opportunity spotting and accumulating

the factors of production necessary for new ventures to be created. They are also responsible for decisions concerning strategy and innovation. In SMEs, the entrepreneur is likely to have an exaggerated impact on the strategy of the firm; thus, any attempt to investigate the innovation ought to include analysis of the characteristics of the entrepreneur (Donckels and Fröhlich 1991). Our study gathered data relating to the educational background of the entrepreneur. Access to educational opportunities is more restricted for women in developing countries (King and Hill 1993), and innovation is associated with the entrepreneur's knowledge and skills (Mahemba and De Bruijn 2003; Lin 1998; Olomi 1999). In Ghana, Sackey (2005) has demonstrated that human capital endowment, measured by schooling attainment, is associated with lower poverty. Takyi-Asiedu (1993) also noted that in sub-Saharan Africa elite parents are more likely to encourage their children to aspire for a university education. It is therefore anticipated that entrepreneurs from middle or upper class families will have higher levels of human capital and will thus be more likely to introduce innovations. We have utilised the level of education as a proxy for social class.

H1 proposes that innovation will be positively associated with middle or upper class family membership, and this is proxied by level of education.

2.2 Firm level resources

At the firm level, innovation has been explored in relation to the internal resources and capabilities of the firm. The RBV proposes that a firm can be conceptualised as a bundle of heterogeneous resources that are combined to create strategies to achieve competitive advantage (Wernerfelt 1984). The level of market returns achieved by the firm is attributable to the resources it controls (Barney 1991; Penrose 1959). Thus, competitive advantage is derived from the combining of physical, human, financial, and technological resources into differentiating capabilities, processes, routines, knowledge, and skills. Competitive advantage is sustained when the differentiating advantages are non-replicable by competing firms. Innovation activity occurs at the firm level (Cohen and Levinthal 1990) and has been associated with resources related to firm size,

growth, age, training, family ownership, and export involvement.

Alternatively, the concept of information asymmetry can also be used to explain why some firms are more innovative than others (Hoffman et al. 1998; Freel and Robson 2004; Freel 2005). Engagement with a broader range of business contacts and the associated access to better information sources could enhance the innovation activity of a firm (Freel and Robson 2004). However, Hoffman et al. (1998) noted that although the influence of external linkages on innovation activity of a firm could be positive, the benefit is not always straightforward or costless and would require technical and managerial resources to extract. Freel (2005) also found that the perception of financial barriers to innovation appears to distinguish the most innovative intensive firms from the least.

2.2.1 Firm size

Previous research concerning firm size and innovation (Schumpeter 1942; Kamien and Schwartz 1982; Scherer 1992; Cohen and Klepper 1996; Bhattacharya and Bloch 2004) has not been conclusive. According to Schumpeter (1942), larger firms are better placed than smaller firms to develop and exploit new technology as a result of larger infrastructure (finance, marketing, R&D), economies of scale in production, and greater capacity to manufacture and distribute products. They have access to a greater range of knowledge, skills, and expertise than smaller sized firms (Rogers 2004). Further, they are better placed to capitalise on the innovativeness of small firms through their ability to mimic innovations (Hausman 2005). In the Ghanaian context a number of studies have shown that smaller firms lack access to both human and financial resources when compared with larger businesses. Small firms are therefore less productive and have lower survival and growth rates (Van Dijk 1997; Teal 1998; Frazer 2005). Resource constraints could explain why small firms were less innovative than larger firms in Kenya and Mauritius (Wignaraja and Ikiara 1999; Wignaraja 2002). In our study, small firms have been categorised in terms of the number of employees: micro (4 to 9 employees), small (10 to 19 employees), and medium (firm with 20 to 50 employees). The minimum level of four employees was decided upon to avoid the bias from the large number of subsistence entrepreneurs in Ghana. The maximum of 50 employees was set to

complement private sector business support programmes which typically target firms with up to 50 employees (Ernst and Young 1997).

In the RBV of the firm, firm size can be employed as a proxy measure for relative resource abundance. Smaller firms face proportionately greater risk from innovation failure than larger firms and receive fewer rewards for being innovative (Sorescu et al. 2003). The increased risk is due to their inability to capitalise on brand value and product diversification that would lower the negative impact of new product failure (Hausman 2005). However, there are some aspects of small firms that suggest that they may be more innovative than larger firms. Small firms are more flexible (Vossen 1998), have flatter structures, and better internal communication than larger firms. This enables them to be more innovative in their responses to changes in customer needs and environmental conditions (Rogers 2004). However, resource constraints may prevent them from implementing innovations (Hausman 2005).

On balance, **H2** proposes that higher levels of innovation will be found in larger firms.

2.2.2 Firm growth

The potential benefit of firm-level investment in innovation is the future stream of revenue from the development and sale of new products and services. Although investment in innovation will consume resources, the consequent growth and profitability of the firm may be associated with greater levels of innovation (Audretsch 1995). Gaining access to the financial data of firms is a sensitive issue, perhaps more so in a developing country where business and family life typically overlap. In Ghana, this is exacerbated by the lack of formal record keeping (Bowditch 1999). For these reasons, firm growth is measured by changes in the number of employees between 2002 and 2005.

H3 proposes that firm growth, measured by changes in the numbers of employees, is associated with higher levels of innovation.

2.2.3 Age

As soon as a firm is created, the entrepreneur begins the task of managing and controlling the integration

of internal resources. Overtime, the firm will develop a repertoire of explicit processes and routines and build up a body of tacit knowledge, which together will constitute its distinctive competencies and capabilities. The relationship between firm age and innovation could also be explained by aspects of institutional theory, specifically the pursuit of legitimacy by new firms in emerging industries. Aldrich and Fiol (1994) used institutional theory to examine the constraints that faced entrepreneurs in emerging industries. They argued that firms involved in the formative years of a new industry faced a different set of challenges (socio-political, lack of institutional support, and uncertainty about the availability of resources) when compared to those that carry on in traditional industries in that “their successful pursuit of legitimacy may evolve from innovative ventures to the broader context” (Aldrich and Fiol 1994, p. 645). On the other hand, Meyer and Rowan (1977) noted that as an organisation becomes embedded in its institutional context, its practical activities become constrained by that context. DiMaggio and Powell (1983) also support this view when they note that in the initial stages of institutionalisation, organisations will display considerable diversity in approach and form, but once the field is established, there is a move towards homogenisation.

Nevertheless, various empirical studies undertaken in Africa appear to support Aldrich and Fiol’s (1994, p. 664) conclusion that the “early phases of an industry’s life also implies that many promising new activities (product or process) never realise their potential because founders fail to develop trusting relations with stakeholders, are unable to cope with opposing industries, and never win the institutional support”. In their study of trade liberalisation, firm performance, and technological upgrading in Tanzania, Deraniyagata and Semboja (1999) found a positive and significant association between the age of the firm and its technological capabilities. Furthermore, Wignaraja’s (2002) study in Mauritius concluded that the age of the firm could probably be positively associated with business involvement in innovation activity because of the accumulated business experience gained over the years (however, the study did not report any statistical association between the two variables). On balance, the age of the firm can be considered as a surrogate measure of the firms’ life-cycle stage and its accumulated

resources and market knowledge (Hadjimanolis 2000). Thus, it might be anticipated that innovation will vary with the age of the firm (Huergo and Jaumandreu 2004) in that older firms are more likely to develop innovation capability than younger firms.

H4 proposes that innovation will be positively associated with the age of the firm.

2.2.4 Training

The quality of the human resources controlled by the firm is determined by the skills levels of employees. The level of knowledge and skills has been found to be related to innovative activities (Mahemba and De Brujn 2003; Lin 1998; Olomi 1999). The quality of human resources can be increased by providing employee training to expand technical capability (Bell and Pavitt 1993), knowledge, and skills (Mahemba and De Brujn 2003). For example, Gospel (1991) suggests that a more highly trained group of workers will be better placed in the development, adaptation, and the implementation of new technologies. Interestingly, in many sub-Saharan African countries, the traditional apprenticeship provides entrepreneurial and technical skills to many entrepreneurs (Palmer 2007; McGrath and King 1999). However, such an approach provides entrepreneurs with limited capacity to undertake innovation activities (Adam 1999; Hausman 2005). Nevertheless, there is evidence of the emergence of a new generation of entrepreneurs who have obtained university education, worked for international organisations, and travel overseas regularly (Buame 1996; McDade and Spring 2005; Hausman 2005). Such entrepreneurs have the capacity to undertake innovation activity. Thus, it would be reasonable to suggest that investment in training would be associated with higher levels of innovation (Romijn and Albaladejo 2002).

H5 proposes that expenditure on training will be positively related to innovation.

2.2.5 Family ownership

The relationship between family ownership of the firm and innovation in either developed or developing countries has not been explored explicitly in previous research. This is surprising given the high proportion

of family-owned firms in most economies. A family business is defined as one where there is one or more relatives of the entrepreneur employed in the business. Family-ownership may dilute the autonomy of the entrepreneur to control and manage the firm, especially if family members have supported the new venture financially. In addition, older family members might wish to utilise existing, older levels of technology with which they are familiar. Family involvement in the management of the firm might constrain risk-taking (Sethi et al. 2001), especially if family and firm goals conflict (Dyer and Handler 1994). This may result in conflict over the direction of the firm, where to focus efforts, and when to introduce innovations (Hausman 2005). Family-ownership may also confer obligations on the entrepreneur to provide employment for family members, irrespective of their knowledge, skills, and capabilities (Buame 1996; Takyi-Asiedu 1993). The closeness of family members may lead to too few weak ties (Granovetter 1985) and impede innovation (Hausman and Fontenot 1999).

More positively, family ownership may provide a supplementary stock of below market-price human resources for the firm. This is particularly important in Africa where institutional support to new venture creation is low (Barr 1999), and entrepreneurs have to rely on family and friends for start-up capital (Adeya 2006). The importance of social capital to entrepreneurship, as discussed earlier, can therefore not be underestimated. On balance, whilst families may provide resources and connections, this is moderated by the possibility that family conventions will constrain risk-taking. Thus, we propose that family ownership is a disadvantage as it is likely to constrain innovation.

H6 proposes that family ownership of the firm will be negatively associated with innovation.

2.2.6 Exporting

Involvement in exporting will expand the entrepreneurs' geographic network and bring them into contact with ideas, products, and services from another country. According to Hite (2005), the problem of limited resources associated with small firms means that they must rely on external networks to provide both opportunities and resources for

survival and growth. In a more recent study, Watson (2007) also noted that networks can serve as a route for entrepreneurs to access resources outside their firms. Exporting creates potential channels for domestic firms to gain access to technical advice and support from partners in different countries (Oyelaran-Oyeyinka et al. 1996). The flow of ideas might lead to the development of new products and services either for the domestic market or for re-export. In a study of export involvement by South East Asian firms, Hobday (1995) found that knowledge about how to innovate was derived from overseas markets by the exporting firms. As a result, exporting had a tangible impact on firm productivity and growth. Indeed in sub-Saharan Africa there is empirical evidence that foreign involvement by domestic firms enhances their innovation and technological capabilities (Wignaraja 2002).

Thus, **H7** proposes that export involvement is positively associated with innovation.

2.3 The environment of the firm

The third theoretical construct of our analysis relates to the external environment of the firm. Resource Dependency Theory (Pfeffer and Salancik 1978) proposes that a firm is embedded in sets of relationships with individuals and organisations in its external environment. The firm's ability to adapt to structural forces, respond to external trends, and build successful relationships with other organisations impacts on its chances of survival. In Ghana, as in many African countries, small firms have been a key part of the economic structure since the 1940s (Ninsin 1989). At the time there were no attempts by the colonial government, or the subsequent government (Convention People Party (CPP)) that took over the internal administration of the country immediately after independence, to develop the small firm sector (Asamoah 1996; McPherson 1996). The promotion of small firms came to the fore during the 1970s when the United Party (UP) government, led by Dr. Kofi Abrefa Busia, highlighted the need to support small-scale businesses by enacting the Ghanaian Business Promotion Act of 1970 (Act 334) (Ninsin 1989). Since the 1980s a number of businesses support agencies have been set up by both the government and the private sector to promote the development of small firms in the country: the National Board for

Small-Scale Industries (NBSSI) was established in 1985 by the government to promote the development of small firms; Empretec Ghana Foundation was set up in 1990 as a UNDP, Barclays Bank Ghana Limited, and the Government of Ghana project. These organisations share the objective of encouraging high quality, growth-oriented, internationally competitive entrepreneurs. More recently, there has been proliferation of small business support schemes from both the public and the private sector. The Africa Project Development Facility report (APDF 2002) documented about 48 donor support programmes alone in Ghana. There are other private-sector small business support programmes that were not captured by the APDF (2002) report, especially the non-governmental organisations (NGOs).

Nadler and Tushman (1997) suggest that events in the firm's external environment impact on its effectiveness in the innovation process. A voluminous literature supports the role of networks and geographic proximity in facilitating technological improvements and competitiveness (Sternberg 2000; Romijn and Albaladejo 2002). In Africa, Chipika and Wilson (2006), Murphy (2002), Barr (1999), and Sverrisson (1997) have shown that networks promote technological learning and innovation activity. Murphy (2002) found in Tanzania that social networks of business people support innovation in manufacturing firms. However, as Chipika and Wilson (2006) pointed out, different kinds of networks have different levels of impact. In a study of networks and growth in Ghana, Barr (1999) noted that the networks of micro and small businesses were aimed at minimising risk and did not encourage innovation, particularly in businesses located in the small towns where access to formal market-supporting institutions were almost non-existent.

In comparison to small towns, large towns and conurbations increase the opportunities for personal interactions and exchange of information (Dickson et al. 1997) and increase the likelihood that the entrepreneur will be exposed to new ideas (Freel 2003). According to Burt (2000), large networks offer more social capital, which could have a positive effect on firm performance. In smaller towns, networks are more likely to include stronger interpersonal ties that are less likely to introduce new knowledge (Granovetter 1985). Successful innovation is therefore likely to be influenced by

relationships and alliances with suppliers, customers, trade and professional associations, government agencies, and universities (Ernst et al. 1994, 1998). The extent of influence is likely to be shaped by the opportunities for interaction and networking with other firms. When firms are located in close geographic proximity to each other, the opportunities for interaction and overspill of ideas are enhanced. Compared to small towns, firms located in large towns and conurbations have access to more diverse contacts and information.

Hence **H8** proposes that firms located in conurbations are more likely to be innovators than those located in less densely populated areas.

3 The Ghanaian context of entrepreneurship and innovation

A review of the historical development of entrepreneurship and small business in Ghana demonstrates that the concept of business enterprise has been part of the Ghanaian culture even before the arrival of the first Europeans in the fifteenth century (Takyi-Asiedu 1993; Buame 1996). As Chamlee-Wright (1997, p. 103) noted, “when the Europeans first arrived in Ghana, long-distance trading into the interior in salt and fish was already well established”. The development of local and long-distance trading relied on the evolution of cultural traditions and institutions that promoted the extension of trade (Chamlee-Wright 1997). This observation was also made by Buame (1996), who noted the existence of entrepreneurial activity before colonisation.

However, Africa has experienced slow growth of entrepreneurial activity since the colonial period (Takyi-Asiedu 1993). The reasons for the slow growth in entrepreneurial activity include government policies (Robson and Obeng 2008; Rogerson 2001; McPherson 1996; Ninsin 1989), socio-cultural factors (Takyi-Asiedu 1993; Buame 1996; Kiggundu 2002), and a lack of human and financial capital (Lall 1995; Teal 1998; McGrath and King 1999).

With regard to government policies, the taking over of internal administration of the country by the Convention People Party (CPP) led by Dr. Kwame Nkrumah did not change the government policy towards small businesses. The first 10-year development plan by the CPP government focussed on the

development of large-scale industries. The government industrialisation policy focussed on the development of large-scale import-substitution industries in order to meet the growing demand for the imported consumer goods by the Ghanaian consumer. The lack of government policies towards the promotion of small businesses has hindered their innovation abilities and hence their development. Malecki (1997, p. 188) observed that “in Africa small business growth has been extremely difficult because innovation and technology had relied on large public and private institutions which also lacked the capacity to transfer the findings to small businesses”. Furthermore, it is also important to note that the perceived bureaucracy and corruption associated with the public sector of many sub-Saharan African countries has also affected the development of small businesses in many African countries because small firms are encouraged to remain small and informal in order to avoid corrupt officials and government bureaucracy (Fadahunsi and Rosa 2002). Ninsin (1989) observed in Ghana that the development of small-scale businesses had been hindered by the political interference, bureaucracy, and corruption to the extent that schemes developed by the government to promote the growth of small firms ended up benefiting large-scale firms. A similar observation has also been made in other countries (Fadahunsi and Rosa 2002; Mambula 2002). Fadahunsi and Rosa (2002, p. 424) found in Nigeria that “most traders operated in a system where bribery and corruption by officials were routine”. However, in recent years the perceived corruption of public officials by entrepreneurs in Ghana has reduced (Robson and Obeng 2008).

Although Chamlee-Wright (1997) noted that the evolution of Ghanaian culture and its institutions facilitated the development of trading activities even before the arrival of the Europeans, the debate concerning the impact of socio-cultural factors on entrepreneurial development in Africa has not been conclusive (Kiggundu 2002; Buame 1996). For instance, Kiggundu (2002) noted that although African society attributed high social status to owner-managers, there were negative aspects to being an entrepreneur. Buame (1996) found in Ghana that entrepreneurs often had to relocate their businesses away from their hometowns because of the fear of the business becoming encumbered with

family members. Also, the tendency for entrepreneurs to employ family members rather than qualified applicants could result in hiring a workforce that is less creative and lacks independent thinking, which in the long run could affect innovation activity of the firm (Malecki 1997; Chamlee-Wright 1997). Furthermore, the culture of Ghanaian society stifles innovation activity as the aged (*opanyin*), or elders, are associated with knowledge or wisdom. Finally, Buame (1996) observed that the innovation activities of a typical Ghanaian entrepreneur are constrained by the fear of losing control and maintaining the “status quo”; hence, the owner-manager acts as the business accountant, sales manager, supervisor, public relations manager, and production manager. The centralisation of control in the entrepreneur stifles employees’ initiative, creativity, independent thinking, and innovation.

Notwithstanding the above negative impact of the socio-cultural factors on the entrepreneurship and innovation activities of Ghanaian small businesses, evidence from a number of studies (Kiggundu 2002; Barr 1999; Takyi-Asiedu 1993) appears to suggest that the extended family system of Ghana could serve as a major source of resources for entrepreneurship development. Buame (1996) showed that entrepreneurs in Ghana used family links and connections as a strategy to enhance access to suppliers, customers, financiers, and authorities in government establishments. Adeya’s (2006) research of Suame clusters in Kumasi (Ghana) reported that many entrepreneurs received family support in the form of apprenticeship training and finance to start-up their business in an environment where an institutional finance for start-up business is extremely limited (Robson and Obeng 2008).

The findings from the above studies demonstrate the importance of social capital in entrepreneurship development in Ghana. According to Burt (2000), the central element of social capital is the network structures that create competitive advantage. Network contacts enhance the survival of the firm (Brüderl and Preisendörfer 1998) and serve as a vehicle by which entrepreneurs can access information outside their firm (Watson 2007). In this way, social capital can produce competitive advantage (Coleman 1990). Also, in a collective society the interest of the group supersedes individual interest, which then promotes social harmony and enhances the sharing of

information and common values. In such a society, the use of social networks to promote entrepreneurship development cannot be underestimated. As Barr (1999) pointed out, networks affect entrepreneurs directly by providing them with information about technology and markets.

However, various studies in network structures and firm performance (Granovetter 1983; Brüderl and Preisendörfer 1998; Burt 2000; Watson 2007) have shown that the structure of networks (in terms of strong or weak ties) could determine the impact of networks on firm performance. Burt (2000) argued that people with networks of weak ties are more likely to be successful than those with strong ties. Burt (2000) associated weak ties with contacts with business partners, acquaintances, former employees, or coworkers, while strong ties were associated with contacts with spouse/life partner, parents, friends, or relatives. Various studies have confirmed that networks which are diverse and include weak ties are more likely to influence the performance of the firm than networks of strong ties (Granovetter 1983; Hoang and Antoncic 2003; Hite 2005; Watson 2007). However, evidence from Ghana (Takyi-Asiedu 1993; Buame 1996, Barr 1999; Adeya 2006) reveals that networks are likely to be dominated by strong ties which are likely to have a marginal impact on the performance of small firms in terms of survival, growth, and innovation activities.

Notwithstanding the apparent lack of innovation activities among small businesses in Ghana, empirical studies undertaken by Malecki (1997) and Sverrisson (1997) have noted various types of innovation activities among light engineering firms in Ghana. Sverrisson (1997) noted that small business success is influenced by the level of education and training obtained by the entrepreneur. Wignaraja (2002), on the other hand, observed that the level of technological capability and innovation ability of a firm is influenced by the type of training and technical assistance received by the entrepreneur. A higher level of education is associated with greater innovation activity (Barr 1999; Hausman 2005). However, Sackey (2005) reported that a substantial proportion (77%) of the entire labour force in Ghana has less than 12 years of schooling and operates in the informal sector and that the majority of small firms are found in this category. On the other hand, the privileged few who have been able to make it to university are found in the

formal labour market and enjoy higher wages and other benefits and therefore have access to more resources than the others. Sackey (2005, p. 49) found in Ghana that “human capital endowment, in the form of schooling attainment, is associated with lower incidence of poverty”. Thus, the concept of dual labour market is reinforced in a situation where large firms built an internal labour market with unionized staff, higher worker wages, and benefits, while small firms remained nonunion and provided only low wages and no benefits (Hirsh 1983).

In Ghana the traditional apprenticeship model is the main mechanism for the transfer of specialised technical and entrepreneurial skills for the majority of small businesses (Palmer 2007; Adam 1999; McGrath and King 1999). However, Adam (1999) noted that traditional apprenticeship in sub-Saharan Africa is associated with low levels of external contacts. Lack of external contacts could result in a low level of innovation activity by businesses that rely highly on this form of training (Hausman 2005). The inability of small businesses to recruit qualified managerial and technical workers due to inadequate finance also implies that innovation activity in those businesses would be undermined, hence affecting productivity, growth, and the overall performance (Van Dijk 1997; Teal 1998; Frazer 2005).

4 Methodology

4.1 Research context

The study was conducted in Ghana, West Africa. Ghana was formed as a result of a merger between the British colony of the Gold Coast and the Togoland trust territory in 1957, making it the first sub-Saharan country to gain independence. It is a constitutional democracy and has a population of approximately 21 million people and a landmass of 239,460 square kilometres (approximately the size of the UK). The country is politically stable, multiparty politics were established in 1992, and free and fair elections were held in 2000. Its stability, system of law and order, and comparatively low incidence of HIV/Aids have created a favourable institutional environment for entrepreneurship. In contrast to the post-colonial economic sluggishness (Takyi-Asiedu 1993), Ghana is now one of the most advanced of the emerging sub-

Saharan nations and potentially has the best conditions to develop an entrepreneurial economy in Africa. According to the World Bank report on Doing Business (2007), Ghana was ranked among the top-ten reformers on the ease of doing business (<http://www.doingbusiness.org>). The Government has invested in business development schemes and was the first West African country to establish a national network for entrepreneurs (McDade and Spring 2005).

Ghana supports a mixed economy. In 2005, agriculture constituted the largest proportion of the GDP (40.4%), followed by services (32.4%) and industry (27.7%). The economic structure is polarised between a small number of large corporations and large volume of micro and small enterprises (Sleuwaegen and Goedhuys 2002; McDade and Spring 2005). Some studies have reported the existence of a “missing middle” of small firms that employ a substantial proportion of the wage labour force (Mkandawire 1999), although Marsden (1990) found less evidence of the existence of the “missing middle”.

The Ghanaian economy is well endowed with internationally valued natural resources (primarily gold, timber, industrial diamonds, and bauxite), which are traded for imports of processed goods (e.g., petroleum, consumer goods, food, intermediate goods, and capital equipment). International trade sustains an annual trade deficit (\$821 million in 2002). The government is committed to facilitating employment creation, accelerating private sector-led growth and expanding Broadband Internet connectivity.

4.2 Sample

In order to ensure a suitable geographical representation, the sample for the survey was drawn from multiple sources of business listings (Ghana Export Promotion Council, Association of Ghana Industries, and Ghana Telecom Directory) because of the absence of a single public register on small business (Wolf 2004; Buame 1996). The data were gathered directly from entrepreneurs in a survey personally administered between January and June 2005 by one of the researchers. Respondents were located in six regions of Ghana where approximately 91% of all businesses in the country are found (Ghana National Industrial Census 1989, p. 12). The face-to-face administration of the survey meant that a response rate of 83.2% was achieved. The survey used Gartner’s (1988) definition

of an entrepreneur; to be included in the survey, respondents had to have created their own business, had to manage their own firm, and they (and/or their family) had to own the firm. To avoid bias in favour of the large number of subsistence entrepreneurs in Ghana, a minimum firm size of 4 full-time employees (maximum 50) was used. Ghanaian Government policy and support organisations, such as the Empretec Ghana Foundation, also target this size of firm. Respondents were from agriculture (18.1%), manufacturing (38.9%), and services (43%). The composition of the sample size was 4–9 (60.2%), 10–19 (23.7%), and 20–50 (16.1%), and the average age of the business sampled was 11.37.

4.3 Innovation in Ghana

Previous studies of innovation have used databases of information, such as registers of patents (Rondé and Hussler 2005). However, in the emerging economy of Ghana, the market for patents is still in its infancy, and a reliable register is not yet available. The most visible output of innovation is a new or modified product or process. Our survey drew on the European Union Harmonised Community Innovation Survey (CIS) (See Kleinknecht and Mohnen 2002) in which respondents are asked to report whether novel or incremental innovation activity had or had not taken place during a specific time period. In our survey, the time period was 3 years. A novel innovation is defined as one that is new to the entrepreneur's firm and also new to the industry. Incremental innovation refers to innovations that are new to the entrepreneur's firm, but not new to the industry. The distinction between novel and

incremental innovation is important in developing countries since resource limitations may constrain novel innovation (Adeboye 1997; Mahemba and De Bruijn 2003). Given the limited knowledge of innovation in developing countries and their imperative to advance economically, the determinants of innovation were investigated in relation to a broad range of products, services, and production processes. Data were gathered about seven categories of innovation: products or services, production processes (including storage), work practices/workforce organisation, supply and supplier relations, markets and marketing, administration and office systems, and product or services distribution. Thus, our focus is beyond the R&D laboratory (Oyelaran-Oyeyinka et al. 1996). Table 1 provides a summary of the hypotheses tested. The survey results reported in the next section relied on data based on the perception of the entrepreneurs rather than the number of registered patents, and it is therefore important to treat the findings of this study with caution. In Africa, there is always the danger that the respondents will provide the answers that they believe that the questioner wishes to hear.

5 Results

Cross-tabulation results for each of the explanatory variables against the seven categories of innovation are presented in Tables 2–5. Table 6 provides a key of the variables which were included in the innovation model. Table 7 reports the regression results. In the raw data, incremental innovation occurred more frequently than novel; the latter ranged from 2.4% to 3.2% for six of the

Table 1 Hypotheses

The entrepreneur

- H1** Innovation will be positively associated with being a member of a middle class or upper class family; this is proxied by level of education

The firm

- H2** Innovation is positively associated with larger firms
H3 Innovation is positively associated with growing firms
H4 Innovation is positively associated with older firms
H5 Innovation is positively associated with expenditure formally committed to training
H6 Innovation is negatively associated with family ownership
H7 Innovation is positively associated with export involvement

The environment

- H8** Firms located in conurbations are more likely to be innovators than those located in less densely populated areas

Table 2 Innovation in Ghana by the level of education of the entrepreneurs

	Postgraduate/professional/ degree/ 'A' level	Technical/vocational/ apprenticeship	Secondary school certificate	Pre-secondary school certificate
Products or services	56.4**	47.7**	41.7**	38.5**
Production processes (including storage)	38.3	26.2	26.2	25.6
Work practices, or workforce organisation	52.3***	23.4***	39.3***	22.4***
Supply and supplier relations	38.3***	16.8***	27.4***	17.3***
Markets and marketing	41.6***	15.0***	23.8***	18.6***
Administration and office systems	43.0***	21.5***	34.5***	15.4***
Products or services distribution	39.6***	23.4***	28.6***	17.9***
<i>N</i>	149	107	84	156

*** Significant at 1% level and ** significant at 5% level using the Kruskal–Wallis test for multi-group comparisons between column entries. Measures of education: (1) The entrepreneur has postgraduate qualifications, professional qualifications, a degree or 'A' levels, which are equivalent to high school graduation in the US; (2) the entrepreneur has technical or vocational qualifications or has completed an apprenticeship; (3) the entrepreneur has secondary school certificate or 0 levels, which are awarded to 16-year-old school pupils; (4) pre-secondary school certificates is the lowest level of education

measures of innovation and was 6.7% for products or services. Thus, we have combined the values of novel and incremental innovation into one measure. This result confirms the predominance of incremental innovation in developing countries (Oyelaran-Oyeyinka et al. 1996; Adeboye 1997). Across the sample, the average extent of innovation by firms is low ranging, from 25.2% (supply and supplier relations) to 46.4% (products and services). The highest level of innovation by sector was found in products and services from service firms (55.1%). Agricultural firms were consistently the least innovative on all measures of innovation, excluding production processes where they were under-performed by service firms (Table 2). For agricultural firms, this result is not surprising as other studies have found that those businesses in the agriculture sector tended to be the most constrained in financial and human resources among the three sectors of the Ghanaian economy (Robson and Obeng 2008).

5.1 The entrepreneur

5.1.1 Social class and educational background

The education level of the entrepreneur was categorised into pre-secondary, secondary, technical and vocational, and advanced. In general, entrepreneurs with graduate, postgraduate, and/or professional

qualifications were the most innovative (Table 2). Entrepreneurs with secondary level qualifications were more likely to have introduced innovations than entrepreneurs with lower level qualifications, although this was only statistically significant (10% level) for production processes. Entrepreneurs with technical and vocational qualifications showed similar levels of innovation to those with lower qualifications, and were more likely to introduce innovations in products or services (47.7%), production processes (26.2%), and products and services distribution (23.4%). This finding supports Sackey's conclusion that the returns to human capital are positive and rise with higher educational attainment, irrespective of gender (Sackey 2005). The results from our study therefore suggest that innovation is likely to be associated with entrepreneurs from the middle class or upper class family. The data therefore support H1 in that innovation is positively related to entrepreneurs from higher social groups (measured by a proxy indicator of educational qualifications).

5.2 The firm

5.2.1 Firm size

Across the sample, a positive relationship between the size of the firm and the extent of innovation was

found (Table 3). Significant differences in the extent of innovation were found between micro firms (<9 employees) when compared to medium-sized firms (20–50 employees). For example, 21.6% of micro firms had introduced an innovation in markets and marketing, compared to 42.5% of medium-sized firms. The relationships were found to be statistically significant in four of the regression models—products or services, production processes, work practices or workforce organisation, and administration and office systems (Table 7). Indeed, this result confirms previous empirical findings that medium and large firms in Ghana and other African countries have higher growth and productivity rates, low survival rates, and are more capable of undertaking innovation activities than small-sized firms due to the formers' resource availability (Van Dijk 1997; Teal 1998; Wignaraja 2002; Frazer 2005, Chudnovsky et al. 2006). This finding demonstrates that the availability of resources influenced the business capability to undertake innovation activity. Thus, the results support H2 and previous research in developing countries. Further analysis to check for non-linearity of the size-innovation relationship followed the suggestion of Bhattacharya and Bloch (2004) to also include a size squared term. The recalculation and re-estimation incorporating a size squared term found no evidence to suggest a non-linear relationship between size and innovation.

5.2.2 Firm growth

The growth of the firm was measured by taking an annualised rate of growth for the period 2002–2005. Most firms (42.1%) were categorised as medium growth (increased employment up to 40% in 3 years), and fast growth firms (increased employment by more than 40% in 3 years) were the smallest group in the sample. Stable firms (12%) were the most innovative in products or services (53.3%), production processes (33.3%), and work practices and workforce organisation (38.3%) (Table 3). Declining firms (28.8%) were the most innovative in administration and office systems, suggesting a greater focus on improving internal administration. The regression models found that the larger the rate of employment growth, the less likely the firms were to be innovators; however, this was only statistically significant in two of the models: administration and office systems, and markets and marketing (Table 7). Thus, the data indicate that growth of the firm is not positively associated with innovation. Further research that adopts alternative measures of growth, such as sales revenue or profitability, may find a positive relationship between growth and innovation.

5.2.3 Age of the firm

In the sample, 52% of firms were classified as young (<10 years old) and the remainder old (10 years or

Table 3 Innovation in Ghana by size, growth, and age of the firms

	Micro	Small	Medium	Declining	Stable	Medium growth	Fast growth	Young	Old
Products or services	42.4**	46.2**	61.3**	42.0	53.3	46.9	42.6	44.2	48.7
Production processes (including storage)	25.9**	30.8**	40.0**	30.8	33.3	28.7	29.6	27.1	32.5
Work practices, or workforce organisation	29.0***	35.0***	55.0***	32.2	38.3	36.8	31.5	35.3	33.8
Supply and supplier relations	23.2**	21.4**	37.5**	21.7	21.7	26.3	29.6	27.1	23.1
Markets and marketing	21.6***	24.8***	42.5***	25.2	16.7	28.2	20.4	26.0	25.6
Administration and office systems	23.6***	31.6***	40.0***	31.5	30.0	29.2	14.8	29.5	27.4
Products or services distribution	26.3	25.6	35.0	29.4	31.7	26.3	20.4	27.1	28.2
<i>N</i>	297	117	80	143	60	209	54	258	234

*** Significant at 1% level and ** significant at 5% level using the Mann–Whitney test for two group comparisons or the Kruskal–Wallis test for multi-group comparisons. Types of business: micro business <9 employees; small, 10–19 employees; medium, 20–50 employees. Employment growth over the period 2002–2005: declining <0%; stable 0%; medium growth >0% and <= 40%; fast growth >40%. Young firms are aged less than 10 years, and old firms are aged 10 years or greater

older) (Table 3). The presence of younger and older firms in an economy is beneficial in that it reflects a balance between entrepreneurial activity and stability. No statistical relationships were found between age of the firm and innovation (See Table 7). When the model was re-estimated replacing the age of the entrepreneurs with the age of the firms in the regression models, firm age was not related to any of the innovations at the 10% level or better. Thus, H4 is not supported as firm age does influence innovation activity, either positively or negatively.

5.2.4 Training

The majority of firms (58.4%) invested in human resource development and allocated expenditure to training (Table 4). Although it might be anticipated that investment in training would increase the capacity of a firm to innovate, a positive relationship was not found in the data or the regression models (Table 7). Although this finding might appear counter-intuitive, it might be related to the nature of training available. As indicated in the literature review, the majority of the entrepreneurs were trained through a traditional apprenticeship model (Palmer 2007; McGrath and King 1999), which provides limited capacity to undertake innovation activity (Adam 1999; Hausman 2005). Therefore, H5 is not supported.

5.2.5 Exporting

Involvement in exporting requires the entrepreneur to interact with non-domestic firms. This is likely to

expand their knowledge and experience, and bring them into contact with new products and service available in other countries. Although only 20.2% of firms in the survey reported that they traded with export markets, they were consistently found to be more likely to be innovators than non-exporting firms (Table 4). For example, 61% of exporting firms introduced an innovation to products or services compared to 42.7% of non-exporting firms. The relationship is statistically significant at the 1% level for all of the models, excluding products or services distribution (statistically significant at the 5% level) (Table 7). Thus, the finding supports previous studies undertaken in sub-Saharan Africa (Oyelaran-Oyeyinka et al. 1996; Wignaraja 2002), and therefore H7 is supported.

5.2.6 Family business

The majority of firms in the survey were family firms (72.1%); this is typical of developing countries where familial structures dominate economic and social life. However, family firms were less likely to introduce innovations than non-family firms. For example, 54.3% of non-family businesses had introduced innovations in products or services compared to 43.3% of family businesses (Table 4). This relationship was statistically significant in all of the models with the exception of innovations in markets and marketing (Table 7). The results suggest that family firms are more conservative in their investment in and/or adoption of innovation. This may reflect familial pressure and obligations to use resources to

Table 4 Innovation in Ghana by R&D, training, family business, and exporter

	No training	Training	Non-exporter	Exporter	Non-family business	Family business
Products or services	47.1	45.9	42.7***	61.0***	54.3**	43.3**
Production processes (including storage)	28.6	30.3	27.0**	40.0**	37.7**	26.5**
Work practices, or workforce organisation	35.9	33.4	31.1***	48.0***	39.9	32.4
Supply and supplier relations	27.7	23.4	22.0***	38.0***	31.2**	22.9**
Markets and marketing	30.0	22.4	22.0***	40.0***	28.3	24.6
Administration and office systems	27.7	28.6	26.0**	37.0**	36.2**	25.1**
Products or services distribution	31.1	24.8	24.2***	40.0***	34.1**	24.9**
N	206	290	396	100	138	358

Significance tests as in Table 3. Types of business: family employs at least one relative of the entrepreneur. Exporting firms exported goods and services outside of Ghana

Table 5 Innovation in Ghana by sector and location

	Agriculture	Manufacturing	Services	Conurbation	Large town	Small town
Products or services	25.6***	46.4***	55.1***	48.4**	51.9**	36.5**
Production processes (including storage)	30.0	34.9	24.8	31.5**	32.4**	22.6**
Work practices, or workforce organisation	28.9	35.4	36.0	42.1***	28.7***	21.7***
Supply and supplier relations	14.4**	27.9**	27.6**	30.0**	22.2**	16.5**
Markets and marketing	15.6	28.6	27.1	28.9	21.3	21.7
Administration and office systems	20.0	30.7	29.4	33.7***	25.9***	17.4***
Products or services distribution	18.9**	32.8**	26.2**	33.0***	19.4***	21.7***
<i>N</i>	90	192	214	273	108	115

Significance tests as in Table 3. Conurbations are firms located in Accra (the capital), Tema and the surrounding area; large towns are settlements with populations of 150,000 to 1,500,000; small towns are settlements with populations of less than 150,000

Table 6 The variables included in our innovation model

Variable	Measure
Postgraduate/professional/degree/‘A’ level	The entrepreneur has postgraduate qualifications, professional qualifications, a degree or ‘A’ levels which are equivalent to high school graduation in the US
Technical/vocational/apprenticeship	The entrepreneur has technical or vocational qualifications or has completed an apprenticeship
Secondary school certificate/‘O’ level	The entrepreneur has secondary school certificate or O levels, which are awarded to 16-year-old school pupils
Size (log)	Number of employees
Growth	Growth in employment
Age of business	Age of the business in years
Training	Dummy variable; firm provides training = 1, otherwise = 0
Exporter	Dummy variable; firm exports goods and services = 1, otherwise = 0
Family business	Dummy variable; firm employs one or more people who are from the family of the entrepreneur = 1, otherwise = 0
Manufacturing	Dummy variable; firm is from the manufacturing sector
Services	Dummy variable; firm is from the services sector
Agriculture	This is the excluded comparison variable
Conurbation	Conurbations are firms located in Accra (the capital), Tema and the surrounding area
Large town	Large towns are settlements with populations of 150,000 to 1,500,000
Small town	Small towns are settlements with populations of less than 150,000. This is the excluded comparison variable

provide employment (rather than invest in innovation), which if not agreed to ‘seriously impair one’s relationships within the family’ (Bowditch 1999, p. 26). Thus, H6 is confirmed.

5.3 The environment of the firm

The environment of the firm was categorised in terms of population, which was used as a proxy for the extent of urbanisation. Firms in large towns

(population 150,000–1,500,000) introduced the most innovations in products and services (51.9%) and production processes (32.4%). However, firms in conurbations (defined as the main cities of Accra and Tema) introduced the most innovations in all the other categories. Firms in small towns (population <150,000) consistently were less innovative in all categories (with the exception of +0.4% difference in innovations in markets and marketing when compared to firms located in large towns) (Table 5). In

Table 7 Estimates of a logit model of the expectation of the business being an innovator, by type of innovator in Ghana

	Products or services	Production processes (including storage)	Work practices, or workforce organisation	Supply and supplier relations	Administration and office systems	Markets and marketing	Products or services distribution
Postgraduate/professional/degree/ 'A' level	0.204 (0.285)	0.333 (0.300)	1.096*** (0.298)	0.993*** (0.311)	1.068*** (0.324)	1.003*** (0.325)	1.002*** (0.319)
Technical/vocational/ apprentice	0.042 (0.295)	0.018 (0.344)	0.039 (0.337)	-0.064 (0.371)	0.111 (0.402)	-0.257 (0.401)	0.368 (0.366)
Secondary school certificatet	0.163 (0.326)	0.151 (0.352)	0.705** (0.331)	0.245 (0.370)	0.724 (0.588)	0.554 (0.401)	0.744** (0.363)
Size (log)	0.798** (0.314)	0.569*** (0.120)	0.545*** (0.021)	0.012 (0.362)	0.846** (0.347)	0.469 (0.386)	0.098 (0.357)
Growth	0.006 (0.005)	-0.008 (0.007)	-0.008 (0.006)	-0.003 (0.007)	-0.030*** (0.002)	-0.016** (0.007)	-0.012 (0.095)
Age firm	0.555 (0.411)	0.389 (0.455)	-0.776 (0.558)	-0.214 (0.522)	-0.544 (0.448)	0.114 (0.359)	0.358 (0.478)
Training	-0.313 (0.235)	-0.144 (0.249)	-0.216 (0.243)	-0.194 (0.257)	-0.072 (0.302)	-0.355 (0.271)	-0.486 (0.414)
Exporter	0.888*** (0.201)	0.516*** (0.065)	0.738*** (0.270)	0.766*** (0.252)	0.373*** (0.071)	0.864*** (0.280)	0.676*** (0.276)
Family business	-0.502*** (0.241)	-0.485** (0.225)	-0.459 (0.299)	-0.467** (0.210)	-0.624** (0.267)	-0.214 (0.295)	-0.515** (0.240)
Manufacturing	1.169*** (0.331)	0.305 (0.321)	0.215 (0.328)	0.729*** (0.032)	0.488 (0.458)	0.872** (0.385)	0.867** (0.357)
Services	1.546*** (0.301)	-0.333 (0.340)	0.068 (0.339)	0.349** (0.155)	0.099 (0.401)	0.558 (0.415)	0.211** (0.090)
Conurbation	0.669** (0.280)	0.639** (0.305)	0.969*** (0.299)	0.707** (0.333)	0.927*** (0.311)	0.445 (0.346)	0.534** (0.226)
Large town	0.700 (0.514)	0.621 (0.406)	0.062 (0.377)	0.006 (0.411)	0.243 (0.427)	-0.195 (0.478)	0.459 (0.414)
Constant	-2.858*** (0.512)	-1.912*** (0.658)	-1.396** (0.671)	-1.607** (0.724)	-1.864** (0.738)	-2.444*** (0.758)	-2.397** (0.741)
-2 log likelihood	530.441	493.202	491.263	443.148	430.277	423.042	445.685
% correctly classified	65.3	72.8	71.5	76.2	75.9	76.8	75.3
N	449	449	449	449	449	449	449

*** Significant at 1% level and ** significant at 5% level. The excluded comparison variables are: for sector agriculture, for location small town, and for education pre-secondary school certificates

the regression models, small towns were excluded, and large towns were found to be more innovative; however, this was only significant for innovations in production processes. Taken together, the results suggest that there is little difference in the relationship between innovation and large town:small town location. However, firms in the two main conurbations are much more likely to be innovators than firms in small towns. This result is consistent with Barr's (1999) observation that the nature of networks which existed among micro and small businesses did not encourage enterprise innovation particularly in businesses located in the small towns where access to formal market-supporting institutions were almost non-existent. H8 is therefore supported.

6 Conclusion

The results of our analysis present a complex view of entrepreneurship and innovation in Ghana. They also suggest that Hadjimanolis' (2000) multi-theoretical approach, which was originally applied to Cyprus, is also useful and applicable to Ghana. Thus, theories relating to entrepreneurship, RBV, and the environmental approach to strategy together provide a holistic picture of entrepreneurship and innovation in Ghana. Whilst there are undoubtedly factors that impede entrepreneurship in developing countries (Vesely 2003), this study finds that entrepreneurs have introduced innovations in a range of products, services, production processes, work practices, and marketing which have brought benefits to their firm.

However, several findings raise (or confirm) concerns about the extent of Africa's ability to develop an indigenous, innovative SME sector. Innovation was found to be positively related to the entrepreneur's level of education. This finding confirms Hausman's (2005, p. 778) observation that "firms managed by individuals whose experience was limited or lacked formal education were less innovative". Various studies have shown that in many sub-Saharan African countries, university education is associated with the middle class or upper class family (Takyi-Asiedu 1993; Sackey 2005), although the recent government policies such as the Capitation Grant, NEPAD/Ghana School Feeding programme, and the promotion of distance learning programmes at the tertiary level could help to improve access to

education for the majority of Ghanaians. However, policies to encourage study towards higher qualifications may be problematic, and instead of increasing entrepreneurship and innovation, may in fact simply increase the number of would-be civil servants and bureaucrats.

In relation to female entrepreneurs, their lack of access to educational opportunities in many developing countries further disadvantages them in the pursuit of an entrepreneurial career. Although traditional social and cultural norms, and economic factors, such as restricted access to capital (McDade and Spring 2005), appear to be constraining female entrepreneurship, long-term policies to overcome these barriers could help to release national entrepreneurial capacity. This might include increased access to formal education for women, the provision of incentives for further study for both genders, and graduate retention incentives in the home country. The development of on-line study opportunities may promote education and learning for individuals unable to attend classes; however, this would be reliant on improved access to new technology.

The dominant form of innovation in Ghana was found to be incremental-introducing products, services, and processes that were new to the firm, but not new to the industry. This confirms the rarity of radical, new to the world innovations being discovered or invented in a developing country. Incremental innovation is a wise and cautious approach to innovation in developing countries as it enables the firm to manage risk by building on the innovations of others. In a resource-poor environment where the financial consequences of business failure are devastating, and potentially life-threatening if they destroy a family's livelihood, incremental innovation reduces some of the risks associated with innovation. Government policies to promote the flow and exchange of ideas between firms and across international borders, and to support technology transfer, would further enhance innovation in Ghana. In addition, policies to create a financial safety net to lessen the impact of innovation failure on the livelihood of the entrepreneur might also increase entrepreneurship and innovation.

The results endorse the positive relationship between firm size and innovation. Although the nimbleness and adaptability of small firms is often claimed to promote innovation, the findings suggest

that resource advantages of larger firms outweigh the flexibility of smaller firms. This may be particularly so in sub-Saharan Africa where pressures on resources ensure that few are ever under-utilised. However, in relation to employment growth, the position is less clear. It has been reported that in order to develop, Africa needs to create millions of employment opportunities for people of working age (Wheeler 1991), yet employment growth was not found to be associated with innovation. At the firm level, a reduction in employment may be the product of improved production processes, which reduces the amount of labor needed. Thus, government policy should strive to achieve a balance among the establishment of new firms, firm growth, and innovation.

The dominance of family firms in the Ghanaian economy is a major constraint on firm-level innovation. Whilst it is easy to suggest the abandonment of cultural obligations to employ family members, and the adoption of competency-based recruitment techniques, such changes would be dramatic and unrealistic in the short term in a society in which the family is a major structural element in society and family obligations a force that few would ignore. However, such changes could potentially deliver important gains at the national level and hence be worthy of judicious consideration. Less controversially, the importance of contacts with other firms, either locally or in export markets, appears to be a fruitful stimulant to innovation, and the encouragement of formal and informal networking is a target that could be achieved with a government-sponsored holistic approach to promote innovation.

In conclusion, the lack of research that has explored entrepreneurship and innovation in Africa means that this paper has the potential to make an important contribution to our understanding of new venture creation and innovation in developing countries. Of the many nations on the African continent, the relative institutional stability of Ghana endorses its potential to create a vibrant, entrepreneurial economy. However, the importance of innovation in driving forward entrepreneurship means that it is equally important to also understand those factors that are related to innovation and those that constrain it. By increasing our knowledge of entrepreneurship and innovation, it is anticipated that the findings will better inform agencies to further encourage and support entrepreneurship and innovation in Ghana.

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