



Financial mechanisms in promoting indigenous innovations in developing countries:
below-the-radar-theory perspective

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Propelling indigenous innovations in low-income economies: Do financial incentives help?

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Abstract

Government incentives are critical to the successful commercialisation of innovations, yet, there are concerns about their efficacy. This study explores the impact of government incentives on the successful commercialisation of indigenous innovations in low-income economies. The theoretical framework built on the below-the-radar theory of innovation has used a sample of 557 firms engaged in the commercialisation of indigenous innovation in the Ghanaian Small-Scale Industry. A partial least squares structural equation modelling (PLS-SEM) was executed to assess 11 hypothesised paths based on a validated questionnaire. The model results indicate that supply-side incentives are insignificant on sales and profitability but have a positive impact on employment growth. The direct and moderating effect of market factors on overall firm performance is also insignificant. However, the demand-side incentives to buyers have a significant positive impact on all the performance metrics and also positively moderate market factors. The main limitation of the study is that the data used in the study were self-reported, where respondents gave their assessments of their innovation performance. However, it is believed SME owners would reflect better on their realities when doing subjective assessments. The current analysis seems to favour demand-side incentives, yet, the study is more of a supply-side view as it measures the effects of government incentives on successful commercialisation from the perspective of firms. This study is original with its focus on the commercialisation of indigenous innovations in the context of low-income economies. Commercialising indigenous innovations could be the antidote to the development challenges facing developing economies. Few studies, if any, have explored the impact of government incentives on indigenous innovation in the context of low-income economies. Therefore, this study is novel in its execution and application to practice and theory.

Keywords: *Below-the-rather theory of innovation, commercialisation, Ghana, indigenous innovations, incentives*

Paper Type: Research paper

1. Introduction

The increasing prominence of innovation as the primary driver of socioeconomic development and the recognition of the need to improve the performance of indigenous firms as an effective development strategy has led African countries such as Ghana to begin paying attention to indigenous innovations. For many low-income economies, it is not just the creation of innovative indigenous activities but their commercialisation that is crucial for economic development (Osoro et al., 2015). Socioeconomic values are created when innovations are successfully commercialised. Given the importance of indigenous innovations and the benefits derived when they are successfully commercialised, decision-makers must understand the phenomena to reap the full economic benefit. Most indigenous innovations do not generate consistent cash inflows, may not be profitable, and firms have to rely on external support at the initial stages (Oderanti et al., 2021), meaning government incentives are crucial for their successful commercialisation. Indeed, incentivising firms through direct grants, tax incentives, concessional credit and other schemes to support their innovation capabilities is accepted as an essential part of most national innovation policies (Mayer, 2018; Yigitcanlar et al., 2019).

There is a limited understanding of government incentives as a driver of the successful commercialisation of indigenous innovation in low-income economies. While the direct and indirect effects of incentives on innovation performance as well as the rationale for these incentives are very sound, their effective delivery and the ability of firms to take advantage of them remain a concern, even in developed economies. This has led to debates over its effectiveness (Sabatini-Marques et al., 2015; Olcay and Bulu, 2015; Carboni, 2017), which calls for further empirical evidence from different countries and contexts. This is essential, particularly in low-income economies in Sub-Saharan Africa, where there is limited literature. Despite these concerns, it is agreeable that incentives are key for successful innovation commercialisation, and it is the policies and delivery methods that have to be redesigned.

There is also some recognition that context matters for the impact of incentives on innovation performance (Yigitcanlar et al., 2016; Proksch et al., 2017; Yigitcanlar et al., 2019). The limited empirical evidence from developing countries is primarily focused on supply-side incentives. An analysis of barriers to innovation in Ghana, for example, raised weak domestic demand as one of the main obstacles to industrial activities (UNIDO, 2015; Quaye et al., 2019). Even though a few demand-side policy prescriptions and incentives are observable in the Ghanaian innovation system, their impact is not yet obvious (Quaye et al., 2019). It is against these backdrops that the study examines the impact of government incentives, on both firms on the supply-side and buyers of indigenous innovation on the demand-side, on firm performance in the Ghanaian small-scale industry (SSI).

The study's findings generate insights into the commercialisation of indigenous innovation. The developed model provides an understanding of government incentives in the small-scale industry sector where resources are constrained, customers have affordability constraints, and imports are

outcompeting indigenous innovation. The study is also one of the first to have applied and tested below-the-radar innovation theoretical frameworks on government incentives and provides empirical evidence in the Ghanaian context. The study provides new empirical evidence from the Ghanaian context that incentives on the demand side may be more effective than those on the supply side of innovation. Again, this study made a contribution to findings regarding the effects of market factors and government incentives on indigenous innovation commercialisation and MSME performance. Government incentives and market factors, although very important in innovation systems, have limited literature and research attention in Africa. Meanwhile, entrepreneurship is being promoted, and small-scale entrepreneurs are being encouraged into the indigenous small-scale industry sector.

The rest of the paper is organised as follows: Section two provides the background to the study, while section 3 discusses the below-the-radar theoretical framework, which underpins the study and the hypotheses. The methodology, results, discussion and conclusion are respectively presented in sections 4, 5, 6 and 7.

2. Background

2.1 Indigenous innovations and economic development in Africa

The debate surrounding the link between innovation and economic development dates back over a century, and yet it is still a burning issue (Cirera et al., 2015; Hu, 2015; Pece et al., 2015; Tiwari & Herstatt, 2017). Generally, innovation drives economic growth and addresses socioeconomic challenges, which is not contestable. There is abundant evidence that growth-enhancing innovations address social challenges and substantially influence opportunities for entrepreneurial activities and their effect on poverty reduction (Cirera & Muzi, 2016; Edler & Fagerberg, 2017; Raghupathi & Raghupathi, 2017). However, neither the optimistic neoclassical views of innovation causing rapid catch-up nor the Schumpeterian views of emphasising organisational and institutional effort for innovation fit the evidence from African countries (Cirera & Muzi, 2016; Pradhan et al., 2018). Indigenous innovation is an innovation that originates locally and (or) is owned by the indigenous people (Nwuke, 2015; Chen, 2017; Phelps, 2017). According to Edler and Fagerberg (2017), indigenous innovation refers to new changes in a local context. In the context of Africa, indigenous innovations include modernisation and use of indigenous resources, indigenous practices and indigenous knowledge, as well as the creation of domestic standards that reduce the burden of paying fees and royalties to foreign countries (Wandera, 2020). In contrast to Schumpeterian innovation, which is seen as exogenous advances brought into an economy by scientists and explorers, emerging indigenous innovation literature distinguishes indigenous innovation as detecting and acting on an opportunity that brings new practice to an economy (Phelps, 2017).

According to Phelps (2017), the impact of the success of indigenous innovation can be different and higher than that of foreign direct investment or adopted innovation as a nation can set its level of innovative activity according to its values. Based on these views, some experts are making a case for African countries to develop their technologies and indigenous innovations (Feige & Vonortas, 2017; Botchie et al., 2017). Relatedly, others observe that the problem for many low-income economies is commercialisation and not the creation of innovative indigenous activities (Shpak et al., 2014; Osoro et al., 2015). It is commercialisation that converts innovations into products and processes that, when accepted on the market and adopted, will build an industry and lead to industrialisation (Olefrenko & Shevliuga, 2017). While the importance of indigenous innovation is well emphasised in the literature (Hu, 2015; Pece et al., 2015; Edler and Fagerberg, 2017; Phelps,

2017, OECD/Eurostat, 2018), most indigenous innovations in Sub Saharan African economies fail to get to the commercialisation stage. Even when they do, the firms do not perform well. Although adoption from developed countries can help narrow the development gap in the short run, there are several issues that prevent developing countries from reaping the full potential benefits of imported innovations, and most of the benefits instead end up accruing to multinationals (Watkins et al., 2015). According to Phelp (2017), the impact of the success of indigenous innovation can be different and higher than that of foreign direct investment or adopted innovation as a nation can set its level of innovative activity according to its values

2.2 Measuring successful commercialisation of indigenous innovation and firm performance

From the literature, innovation and its commercialisation performance metrics include the number of patents, utility models, trademarks, industrial designs and copyrights as proxies of creative outputs; and sales, market share, productivity, profitability and employment as internal firm-level performance (Lhuillery et al., 2016; Cirera and Muzi, 2016; Rass et al, 2013; Cirera. and Maloney, 2017). Measuring successful commercialisation of innovation at the firm level is, however, a subject of concern due to definition, measurement, methodological and inferential challenges (Dijkhuizen et al., 2018). While some innovations are considered successful if they merely survive, others must demonstrate a large market potential. Moreover, the performance of indigenous innovation and innovation, in general, is quite difficult to measure in low-income economies as it is not a standard process with defined milestones and checkpoints (Cirera and Muzi, 2016). This is also compounded by the fact that most available input metrics such as R&D spending do not give a whole picture and are largely not applicable to MSEs in these economies.

For examining the effects of government incentives on micro and small firms engaged in the successful commercialisation of indigenous innovation, sales performance, profitability and employment generation are most appropriate and can be important proxies (Laforet, 201; Shpak, et al., 2014; Olefirenko and Shevliuga, 2017). Economic growth in terms of GDP, income and employment are very crucial for African countries. Indeed, the main reason for a policy focus on firms in the indigenous small-scale industry as a significant strategic sector in the promotion of entrepreneurship and innovation is because of its potential for GDP, income and employment growth (Musah, 2017; Chege and Wang, 2020). From macroeconomics, its sales of new products and services lead to GDP growth, profit income of new firms that lead to increased national income and employment generated by innovative firms that lead to increased employment.

Few studies emphasised sales and sales variables as one of the primary measures of successful commercialisation of innovation (Lhuillery et al., 2016; Cirera and Muzi, 2016; Mahmutaj and Krasniqi, 2020; Bayer et al. 2020). Metrics such as sales and its growth from innovation can easily be tracked, and can point out what exactly a firm is getting from its innovation efforts (Cirera and Muzi, 2016). Akinboade (2015) econometrically examined determinants of the growth of SMEs and highlighted sales and firm growth as crucial for a full understanding of policy development in Africa. In the context of Ghana, there are only a few empirical studies (Oduro and Nyarku, 2018; Quaye and Mensah, 2019) on sales growth as innovation performance metrics. The sales growth metric acts as a rallying call for an entire business including the innovation team, investors, and other external stakeholders. Indeed, it is successfully commercialized and market patronized innovations that impact business output, market dominance, further exploitation, development of new industry, and hence growth and socioeconomic development (Shpak et al., 2014; Osoro et al.,

2015). Since the widespread sale and wide adaption of innovation is considered as successful commercialisation (Olefrenko and Shevliuga, 2017), understanding the link between sales variables and government incentives are very crucial in formulating effective strategies for incentivising firms.

The profitability of firms in SSI is essential to measure their efficient use of resources and the effectiveness of their innovation teams. The extent to which an innovation is profitable determines the reward of the innovator and the tangible benefits to other stakeholders (Laforet, 2011). Sociologically, the potential of innovation and entrepreneurship to change societal structure is dependent on profitability as it is the stream of profits that makes the lead innovators rich and climb the social ladder together with their families. The interest in the profitability of innovation goes beyond internal stakeholders but extends to external backers who can help take indigenous innovation further and are always interested in the projection of future profitability of innovation (Vuorio et al., 2020). One main justification of state intervention in providing financial incentives to Micro and small enterprises is firm survival and protection of livelihood and this can be achieved when firms make a profit. In today's competitive global environment, it is hard to sustain indigenous innovation with a low profitability level (Zainalabidin et al. 2015; Bryla, 2017). Moreover, there is increased pressure on the application of impact evaluations of government support policies recently (Crowley and McCann, 2017; Dvoulety and Blazkova, 2018). Donor funding for innovation supports (for instance EU Regulation No. 1303/2013) also requires the evaluations of support programmes "to improve the quality of the design of programmes, and ensured objectives and targets are met. It is therefore imperative to assess the effect of government incentives on the profitability performance of firms engaged in the commercialization of indigenous innovation

Estimating the effects of government support in incentivising firms engaged in commercialisation is also important for job creation reasons. The main reason for a policy focus on the need to improve the performance of indigenous firms as an effective development strategy is because of their potential for employment generation (Musah, 2017; Chege and Wang, 2020). Data from the Ghana Statistical Service showed micro and small enterprises (SMEs) predominate the Ghanaian business environment and about 30% of the Ghanaian economy are small scale industrial activities (Ghana Statistical Service, 2015; Addo, 2017). New job creation by MSEs and employment growth have attracted research attention as a good innovation performance indicator, because of their visibility and simplicity to obtain (Mahmutaj and Krasniqi, 2020). Indigenous innovation is expected to create jobs and generate income for the poor, as it is mostly frugal it is expected to reduce technological sophistication, intensively use local resources and employ more labour per unit of capital (Radjou et al., 2012).

2.3 The Small Scale sector and innovation performance in Ghana

The commercialisation of indigenous innovation is most observable in the small scale industries (SSI) and among micro, small and medium enterprises (MSMEs) in Ghana. Data from the Registrar General and Ghana Statistical Service also showed MSMEs predominate in the Ghanaian business environment, and about 30% of the Ghanaian economy is comprised of small-scale industrial activities (Ghana Statistical Service, 2015). Textile and garment manufacturing, pottery and ceramics, carpentry, arts and woodwork, metal fabrication, fishing, water and beverage manufacturing, and agro-processing are some of the specific small-scale industrial activities (Ghana Statistical Service, 2015). Both Ghana's revised industrial policy and the revised STI

policy recognise small-scale industry as a key actor in achieving the policy goals (MESTI, 2017). It is MSMEs and small scale entrepreneurs who are at the forefront of the commercialisation of indigenous innovations.

Small-scale industries (SSIs) have become a policy focus because of the perceived capacity to serve, create jobs and generate income for the poor, which extends from the intensive use of indigenous knowledge and inputs (Zeschky et al., 2014; Osei et al., 2016; Donkor et al., 2018). The Ghanaian SSI no doubt plays an important role and several studies have examined its relevance in terms of use and value addition to indigenous resources, application and preservation of indigenous knowledge, contribution to employment and household income, poverty reduction, gender empowerment; and economic expansion in the socioeconomic development process of the country (Osei et al., 2016; Donkor et al., 2018; Thorbecke, 2018; Quaye & Mensah, 2019; Tsatsenko, 2020). On the other hand, there is also overwhelming evidence that the small scale industry is plagued with low growth rates, stale development of innovation, stagnation, limited commercialisation, low returns and firm exit (Tsatsenko, 2020). Available literature largely also portrayed a poor picture of Ghana's innovation performance (Oduro-Marfo; 2015; Mountjoy, 2017; MESTI, 2017; UNESCO. 2018; Cornell University et al., 2018; Quaye et al., 2019). According to the World Bank's data, the value-added per agriculture worker in Ghana is only a third of the Philippines and a tenth of Brazil (World Bank, 2019). Dutta et al. (2016) observed that Ghana's innovation performance has, over the year, been exceedingly low and noted that the country's ranking on the innovation index has been low since the inception of the Global Innovation Index (GII). The GII assesses world economies based on their innovation capabilities and has ranked Ghana 107th in 2018, 106th in 2019, and 108th in 2020 out of 143 countries in terms of innovation performance (Cornell University et al., 2017; 2018; 2019; 2020).

According to Bartel et al. (2016), the relative positions of Ghana on the innovation indexes are not out of tune with those of Sub-Saharan African countries and other "factor-driven" economies. Bartel et al. (2016) explain that typically factor-driven "economies have limited capacity to innovate and add value to the goods and services they produce; have unsophisticated local enterprises with limited managerial and organisational capacity; have minimal commercial and technological links to the global economy; use low-wage, poorly educated and unskilled labour to produce; and export unprocessed raw materials. These facts raise the need to do more and transform the SSI sector in terms of innovation and commercialisation if the sector is to contribute more meaningfully to the economic development of the country.

3. Theory and Hypotheses Development

3.1 Below-the-radar theory of innovation and the commercialisation of indigenous innovations

The research is primarily anchored on the below-the-radar theories of innovation (BRTI). A comprehensive theoretical model that fully explains how innovation in low-income economies, occurs, gets commercialised, diffuses, and creates impact is still emerging (Ockwell and Byrne 2016). Emerging frameworks that explain outlier trends, the global imbalance in innovation hegemony and the needs of the "bottom billion" (the poor) are termed the below-the-radar theories of innovations (BRTI) (Kaplinsky et al., 2010). BRTI provides a direction for researchers to analyse innovation systems in developing countries. The frameworks recognised that in low-income economies, minor changes in any of the elements in Schumpeterian conceptualisation

could create considerable impact (Kaplinsky et al., 2010; Radjou et al., 2012; Bhatti, 2012). In low-income economies, it is the modest and non-technological innovations, often ignored by science and technology indicators, that translate into a substantial increase in the ability to produce and compete on a sustained basis, generating income, employment, and better living standards (Clark et al., 2009; Harilal, 2017; Marques et al., 2018).

The below-the-radar innovation concept is still emerging, and there are various variations. However, the bottom of the economic pyramid (BOP) (Prahalad, 2005) particularly underpins this study. The central argument in the BOP proposition is that the poor are potential consumers and, since they are a large portion of the population, they (at the BOP) represent a huge unexploited market. The poor are, however, excluded from mass consumption because of their limited purchasing power (Prahalad, 2005). Prahalad propounded that if a firm can find a way to turn the poor into consumers, it finds a fortune and an almost unlimited market. Prahalad's proposition also stressed that for innovations to be appealing to the BOP, they have to be designed to do more with less and for more people (Prahalad & Mashelkar, 2010; Prahalad, 2012).

Anderson and Markides (2007) stressed that there are common challenges and approaches in serving low-income customers in developing markets and that these can be articulated and refined to get better business results. The common factors that characterised innovation at BOP have been identified as affordability, acceptability, availability, and awareness (4As), and Anderson and Markides (2007) posit that by leveraging these 4As, firms can achieve better business results in terms of growth and profit. Below-the-radar solutions should be designed, produced, delivered, and maintained to meet the needs of underserved consumers, and firms should be able to function in constrained environments (Bhatti, 2012).

As in other African countries, firms in the Ghanaian SSI largely cater for the poor, who have affordability constraints and cannot, as such, charge premium prices to recover high distributive margins, which are often required for the commercialisation of innovation (Okoe and Boateng, 2016; Anderson, 2020). Moreover, these firms face fragmented markets and distribution, promotion and product reach are serious challenges. These firms also face a very high cost of doing business (Nyarku and Oduro, 2017; Chan et al., 2018), but at the same time have to devise means of serving income-constrained customers to promote and distribute their products. The commercialisation of indigenous innovation in Ghanaian SSI, therefore, offers an interesting context to test and study the BOP views.

It is emerging from the literature that for low-income countries such as Ghana, indigenous innovation is driven by ingenuity and savvy to make and market an invention (Ockwell and Byrne, 2016; Phelp, 2017). Scientific knowledge, human resources and capital alone, as prescribed by earlier theoretical models, are not enough, and favourable market conditions are required for successful commercialisation. The BOP proposition posits a strong link between market factors and firm performance (Anderson and Markides, 2007; Prahalad and Mashelkar, 2010). BRTI also recognise and highlights the need for innovation to serve the poor in the resource and affordability constrained environment (Prahalad, 2005; Radjou et al., 2012). BRTI's view of creating massive exchange value for the poor (Clark et al., 2009) and the requirement of a significant reduction in the cost of development, manufacturing, distribution ownership or usage and disposal of products (Tiwari et al., 2014) necessarily implied some sort of state incentives for successful commercialisation. The central assumption of this paper is that government incentives can have a substantial influence on firm-level performance in the commercialization of indigenous

innovation. Thus, the study's primary constructs are government incentives as independent variables and successful commercialization measures as dependent variables.

3.2 The role of government incentives in promoting indigenous innovations

From the literature, the link between incentives and their moderating effects on factors such as market factors and firm-level innovation performance, as well as the rationale for government incentives are very sound (Olcay and Bulu, 2015; Guan and Yam, 2015; Carboni, 2017; Yigitcanlar et al., 2019). Olefirenko and Shevliuga (2017), in explaining successful commercialisation, identified financial, organisational, and regulatory supports as a triangle of support and emphasised that a significant role of the state is required. Other scholars observed that firms on their own may shy away from innovation commercialisation due to the high risks and costs involved, and therefore, government innovation support mechanisms are required (Thomson and Jensen, 2013; Guan and Yam, 2015). The debate about the efficacy of incentives largely focused on direct incentives to firms in the form of grants, tax incentives, concessional credit and other direct schemes to support firms increase innovation capabilities, cover part of their R&D costs and minimise their organisation, market and financial risks (Mayer, 2018; Yigitcanlar et al., 2019).

In spite of the increased focus of policymakers and the push for government interventions to support indigenous innovation, there are still ongoing academic debates on the effectiveness of government incentives (Zhang and Wu, 2014; Sabatini-Marques et al., 2015; Huergo et al., 2016). A number of scholars argued government incentives, particularly financial support, in general, positively moderate the relationships between other factors and firms' innovation performance (Carboni, 2017, Zhang and Guan, 2018). Others claimed government incentives have several drawbacks, and financial incentives may just substitute firms' own innovation expenditures (Zhang and Wu, 2014; Guan and Yam, 2015). Other scholars portrayed and confirmed inverted U-shaped associations explaining that incentives are positively associated with innovation performance until a certain threshold value (for some time), after which the positive effect will gradually diminish and eventually turn negative (Zhang and Guan, 2018; Zhu et al., 2019). Zhang and Guan (2018) offered solid empirical support for the effects of government incentives over time and showed that subsidies favour firms in the short term but hinder them in the long term. Some scholars suggested the efficacy depends on factors such as industry conditions, country institutional factors, firm size, and size of the intervention (Huergo *et al.*, 2016; Srhoj and Zilic, 2020).

From economic theory and system perspectives, government incentives can influence both the demand and supply sides (Marx *et al.*, 2014; Osoro *et al.*, 2015 Dahlstrand *et al.*, 2016). Marx *et al.* (2014) explained that the technical part or the supply side of innovation commercialisation innovation is the system's capacity, including the ability of agents to absorb scientific or technological information and the ability to source complementary assets and support capabilities to develop a variety of innovation and business ideas to be put on the market for selection. The demand-side (or the market aspects) of innovation commercialisation has been explained as the efficiency of selection and scaling up of innovations and businesses on the market (Marx *et al.*, 2014; Dahlstrand *et al.*, 2019). Phelps (2017) opined successful commercialisation involves both the innovators and customers realising values and explained that a product could be excellent in terms of quality and skilfully marketed, but if few customers in the marketplace are interested, that product would still fail. Again some scholars explained commercialisation and economic success occur through the creation of a variety of innovative activities, selection and retention of the winning innovations while letting go of the losing ones in a dynamic and hierarchical market (Stam

and Spigel, 2016; Dahlstrand *et al.*, 2016). All these views suggest incentives on the demand side might improve efficiency and effectiveness.

3.3 Incentives to firms and firm performance

The literature provided varying evidence of the positive effects of government incentives to firms for innovation activities and firm performance (Olcay and Bulu, 2015; Amankwah-Amoah and Sarpong, 2015; Olcay and Bulu, 2015; Carboni, 2017; Yigitcanlar *et al.*, 2016; Srhoj and Zilic, 2020). Broadly the generic strategies of integrating a level of state financial support in the innovation system have a positive effect on innovation activities and firm performance (Ioppolo *et al.*, 2016; Carboni, 2017).

In the Ghanaian context, Amankwah-Amoah and Sarpong (2015) examined the evolution and scaling up of solar photovoltaic technology in Ghana from 1980–2010 and concluded that government policy providing incentives to enhance local firms' capacity building could help develop a competitive manufacturing base. Afful Owusu (2017) analysed the drivers of innovation from the Ghana Enterprise and Innovation Follow-Up Survey, observed weak product and process innovation and called for R&D subsidies for firms. From the Ghanaian innovation system, the identifiable commercialisation incentives elements to firms include grants, concessionary loans, free/subsidised inputs, regulatory relaxation, and government purchases and free training (OduroMarfo, 2015; Amankwah-Amoah, 2016; MESTI, 2017b; Udimal *et al.*, 2019). This decade, for example, has seen the proliferation and over-concentration on training support as a panacea intervention for SMEs

Based on the debates in the literature Hypotheses H_{1a-c} propose that government incentives to firms (GINMSE) engage in the commercialisation of indigenous innovation will lead to better firm performance and are set as follow:

H_{1a} : GINMSE is positively related to sales growth of indigenous innovation.

H_{1b} : GINMSE is positively related to the profitability of indigenous innovation

H_{1c} : GINMSE is positively related to the employment level of SMEs in SSI

3.4 Incentives to buyers of indigenous innovation (GINBU) and firm performance

The Empirical evidence is largely centred on the supply-side incentives. However, a few emerging views (Mersky *et al.*, 2016; Zhang *et al.*, 2016; Eisenberg and Price, 2017) offered plausible evidence that demand side-incentives to buyers (GINBU) can positively influence innovation and firm performance better. Narassimhan and Johnson (2018), for example, using commercialisation of plug-in electric vehicles, examined over 400 supply- and demand-side incentives and regulations in the U.S. and offered some plausible evidence that within tax incentives, rebates on the demand side are generally more effective. Other scholars found some evidence in the Scandinavian countries that demand-side non-monetary incentives such as toll and parking exemptions are more effective in increasing sales of electric vehicles than subsidies to firms (Mersky *et al.*, 2016; Zhang *et al.*, 2016). Eisenberg and Price (2017) explained that greater involvement of payers and incentives to innovation users is more efficient and effective than incentives to firms or innovation sellers which rather promote the use of expensive technologies and costly new products. From BRTI perspectives, low cost of products, consumers reduced cost

of using the innovation and use of appropriate technology are key for successful commercialisation (Eisenberg and Price. 2017).

Specifically, in Ghana, weak domestic demand has been raised as one of the obstacles truncating innovation and its commercialisation (UNIDO, 2015; Quaye et al., 2019). There is, therefore, the need to further investigate how demand-side policies could be used to stimulate the commercialisation of indigenous innovation. The model, therefore, proposed that government incentives to buyers of indigenous innovation will lead to better firm results and hypotheses H_{2a-c} are set as follow:

H_{2a}: GINBU is positively related to sales growth of indigenous innovation.

H_{2b}: GINBU is positively related to the profitability of indigenous innovation

H_{2c}: GINBU is positively related to the employment level of firms in SSI

3.5 Moderating effects incentives for innovation and firm performance

From the literature, government incentives, in general, positively moderate the relationships between other factors such as finance, regulation and market factors and firms' innovation performance (Carboni, 2017; Zhang and Guan, 2018; Udimal *et al.*, 2019). Specifically in Ghana, Udimal et al. (2019), provided some evidence that foreign capital combined with government tax credit and subsidies had a significant influence on new product innovation. From available data, prices of indigenous innovation are very high relative to imported innovations, most indigenous Ghanaian products have poor finishing, and most MSMEs are unable to brand and promote their innovations leading to the speedy fading out of most indigenous innovations in favour of imports (Quaye & Mensah, 2019). Inferring from this evidence, Hypotheses 3, 4a, 4b, 5a and 5b are therefore presented as follows:

H₃: Market factors are positively related to indigenous innovation and firm performance

H_{4a}: GINMSE is positively related to indigenous innovation and firm performance.

H_{4b}: GINBU is positively related to indigenous innovation and MSE performance

H_{5a}: GINMSEs positively moderate the effects of market factors on the commercialisation of indigenous innovation and MSE performance

H_{5b}: GINBU positively moderates the effects of market factors on commercialisation and firm performance

4. Research Contexts and method

The study sought to establish the direct and moderating effects of the supply side and demand side government incentives on the successful commercialisation of indigenous innovations in Ghana. Three dimensions of successful commercialisation measured by firm performance metrics of sales, profitability and employment generation were the dependent variables. Government incentives to firms (GINMSE) and government incentives to buyers of indigenous innovation (GINBU) in Ghana were the predictor variables. The hypothesised model for the study is presented in Figure I below.

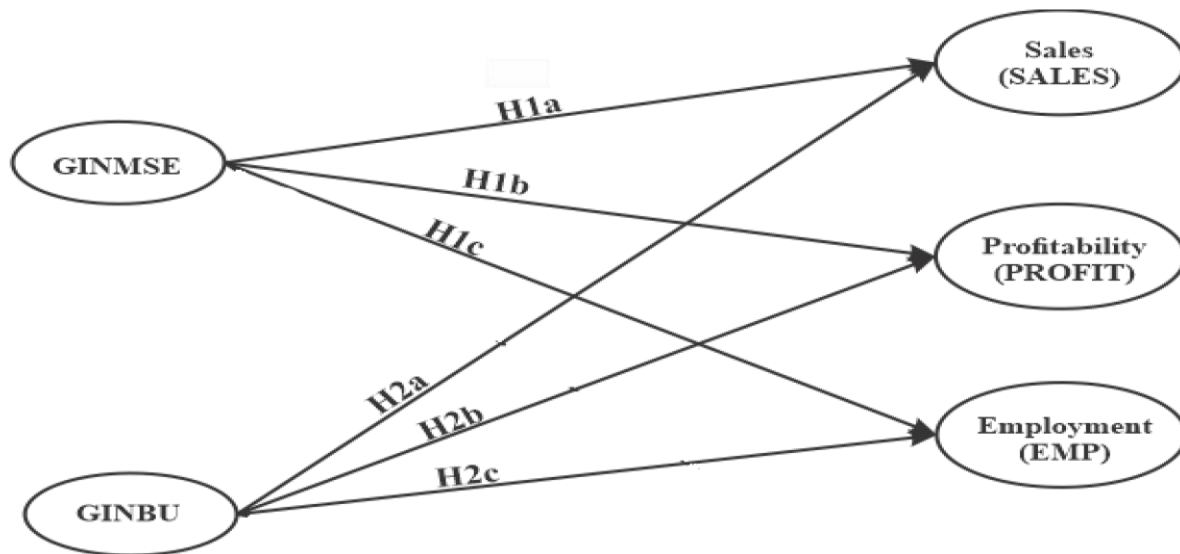


Figure I: A hypothetical model of direct effects of incentives on firm performance

The study also examined moderating influence of incentives to firms and incentives to buyers on market factors, measured as the cost, market price, and promotional as well as distributional efforts of firms.

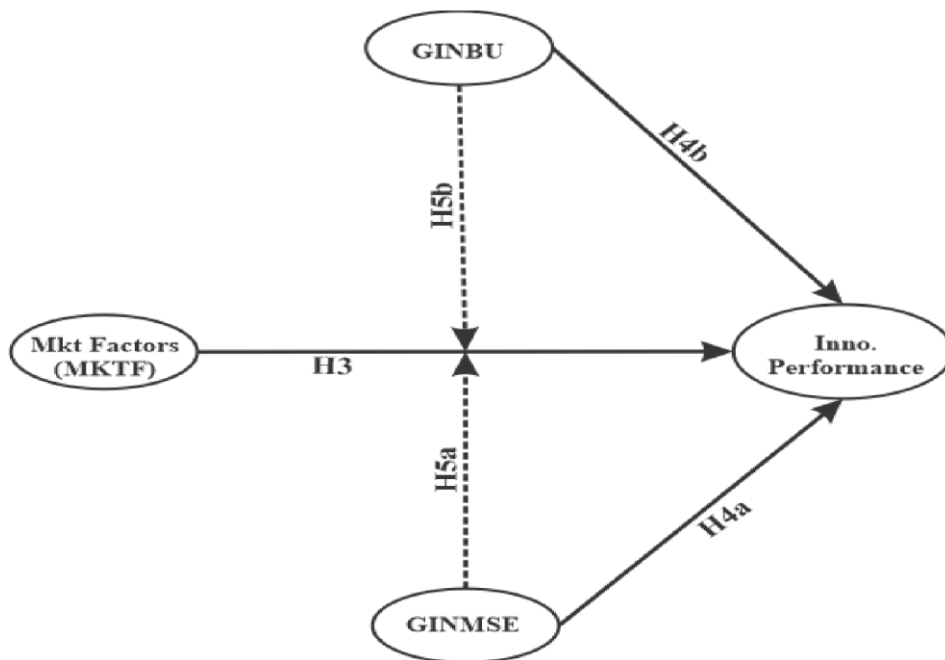


Figure II: A hypothetical model of moderating effects of incentives on overall firm performance

Table I: Factor descriptions

Factors	Description	Source
Sales revenue	Sales revenue and the growth of the sampled firms over a 5-year sales period	(Bayer et al.,2020)
Profit Margin	Profit margin and income growth of the sampled firms over 5 profitability year period	(Lee et al.,2018)
Employment Growth	Employment generated by the firm and its growth over 5 years employment period	(Anning-Dorson, 2018)
Market Factors	Market variables such as cost, market price, and promotional as factors well as distributional efforts of firms.	(Anderson & Markides, 2007)
Government incentives to firms (GINMSE)	Government innovation support for firms including receipt and use of government grant, regulatory relaxation, free or subsidized	(Mayer, 2018; Yigitcanlar, Sabatini et al., 2019).
Incentive to buyers (GINBU)	Incentivizing to users and payers for innovation in the form of a grant; tax rebates; government purchases; subsidized complements and concessionary loans	(Mersky et al., 2016; Zhang et al., 2016; Eisenberg & Price, 2017)

The data collection method of this research is a survey instrument based on multi-item psychometric scales that collected and measured MSME respondents' views in Ghana. It is based on a case study of 537 SME owners, with a response rate of 85 per cent, engaged in the commercialisation of indigenous innovation in the small-scale industry (SSI) in Ghana. The case study approach allows for interviewing MSME owners/managers, the key agent of commercialisation, and provides an in-depth understanding of the causal drivers of the phenomena of indigenous innovation and its commercialisation. Quantitative and deductive reasoning approaches were used. Descriptive statistics and Partial Least Square–Structural Equation Model (PLS-SEM) was used to test the model and analyse 11 set out hypotheses. SPSS version 25 was used to validate the variable items and conduct the frequency analysis together with Smart PLS 3.3.3 to estimate the proposed model.

The study involves an examination of causal and effect relationships between several independent and dependent variables hence the PLS-SEM analysis is the most preferred statistical tool (Ong and Puteh, 2017; Hair *et al.*, 2019). Following the prescriptions of Ringle et al. (2015) and Hair et al. (2019), the measurement model was first examined to ensure all the required criteria are met. The reliability was measured using Cronbach's α and composite reliability, while validity was measured using convergent and discriminant validity. The result of the reliability and validity tests (tables II) demonstrates that all the indicators have significant loadings.

Table II: Reliability and convergent validity results

Items	Loadings	SE	t-statistics	p-values	CA	CR	AVE
Sales1	0.662	0.039	16.801	0	0.883	0.91	0.671
Sales2	0.828	0.024	35.234	0			
Sales3	0.828	0.023	36.451	0			
Sales4	0.896	0.014	66.333	0			
Sales5	0.861	0.014	60.058	0			
Prof1	0.647	0.039	16.51	0	0.881	0.912	0.677
Prof2	0.897	0.012	73.289	0			
Prof3	0.824	0.018	46.88	0			
Prof4	0.896	0.007	124.468	0			
Prof5	0.825	0.01	81.734	0			
Emp1	0.585	0.078	7.493	0	0.837	0.897	0.748
Emp2	0.801	0.036	22.219	0			
Emp3	0.85	0.028	30.78	0			
Emp4	0.67	0.051	13.155	0			
Emp5	0.953	0.006	156.771	0			
Emp6	0.943	0.01	93.36	0			
GINBU	1-It em				1	1	1
GINMSE	1-It em				1	1	1
MktF1	0.924	0.006	158.537	0	0.871	0.906	0.62
MktF2	0.833 0.864	0.016	52.908	0			
MktF3	0.624	0.014	59.857	0			
MktF4		0.028	22.07	0			
MktF5	0.638	0.04	15.821	0			
MktF6	0.795	0.021	38.188	0			

Note: Emp = Employment; GINBU = Government incentives to innovation buyers; GINMSE = Government incentives to MSEs; MktF = Market Factors; Prof = Profitability; SE = Standard Error; CA = Cronbach's Alpha; CR = Composite Reliability; AVE = Average Variance Extracted

All the constructs in the study are satisfied. The CA ranged from 0.837 to 0.909 and above the Cronbach's $\alpha > 0.7$ thresholds (Shmueli *et al.*, 2019). The C.R. fall between 0.897 and 0.912 and the AVE between 0.620 to 0.748, which are respectively higher than the recommended threshold of 0.70 and 0.50 (Hair *et al.*, 2019; Shmueli *et al.*, 2019). Again, all the Heterotrait-Monotrait Ratio (HTMT) values for determining the discriminant validity of the constructs (Table III) are below the recommended maximum threshold of 0.85.

Table III: Discriminant validity by (HTMT) criterion

Variables	1	2	3	4	5	6
1. Emp						
2. GINBU	0.065	0.455				
3. GINMSE	0.102	0.103	0.084			
4. MktF	0.259	0.66	0.236	0.164		
5. Prof	0.424	0.751	0.348	0.003	0.589	
6. Sales	<u>0.329</u>	<u>0.654</u>	<u>0.321</u>	<u>0.072</u>	<u>0.3</u>	<u>0.475</u>

The reported HTMT values also signify the establishment of the discriminant validity for all the concepts. Per the prescription of Hair et al. (2019), the constructs met all the required criteria in the measurement model. Therefore, the structural model can be evaluated.

5. Results

5.1 Descriptive Statistics

In this study, men constitute 40.8%, while women constitute 59.2%. Most of the respondents, nearly 70%, are under 36 years, and only 1.3% are 55+. Nearly almost all respondents (over 95%) have at least secondary education. The captured sample included agro-processing (24%), textile and garment (including Kente weaving), 20%, building and related trades (19%), pottery and ceramics (12.6%), woodworks including craft and basketry (2.4%) and metal works (12%) applying ingenious innovation. In respect of the types of indigenous, the sample is characterised by either the use of indigenous inputs, further application of indigenous knowledge or both, constituting over 80%, and those adapting new technology to indigenous knowledge constitute just about 18 % of the data. Specifically, 51% of the sampled MSMEs responded they rely on government incentives, of which only about 2% rely on grants, regulatory relaxation, free or subsidised inputs and concessionary loans. The majority (47%) only receive free training. Similarly, about 22% responded their buyers rely on government incentives, of which government purchase is 12%, a tax rebate is 5%, and subsidised complements, grants, and concessionary loans constitute 5%.

5.2 Testing the direct effects of government incentives on firm performance

In examining the relationship between government incentives and the successful commercialising of indigenous innovation, a structural model was assessed to estimate the effects of incentives on firm performance. The model predictive power, predictive relevance and fit are presented in Table IV below.

Table IV: Model predictive power, predictive relevance and fit

Construct	R ²	Adjusted R ²	Q ²	SRMR
Sales	0.16	0.154	0.155	0.055
Profitability	0.398	0.394	0.395	
Employment	0.092	0.086	0.047	

The Adjusted R² statistics indicate that the model explains 15.4%, 39.4% and 8.6% and of variations in sales, profitability and employment level, respectively. This implies that the government incentives significantly contribute to the variations in the performance of firms engaged in the commercialisation of indigenous. Correspondingly, the Q² values of the model span from 0.047 to 0.39.5, which are > 0.0, establishing the fact that the PLS structural model has some predictive relevance. The results also show that the model has a good fit as the SRMR is 0.055, which is less than the 0.08 threshold (Hu and Bentler, 1998; Hair *et al.*, 2019). From R² and Q² statistics, the model has satisfactory predictive power, and variations from the incentives have some small effects on sales and employment and moderate effects on profitability (Shmueli *et al.*, 2016; Hair *et al.*, 2019).

The results of the assessment include the VIF (i.e., collinearity check), path coefficients (β), standard errors (S.E.), t-statistics, and p-values. The path results are presented in Table V below. All the VIF values are beneath the more conservative threshold of 3.3, signifying that collinearity is not at critical levels (Hair *et al.* 2019), hence the path relations can be examined.

Table V: Direct effects of government incentives

Hypotheses	Path	VIF	β	SE	t-values	p-values	Significance at 5%
H1 _a	GINMSE => Sales	1.045	-0.058	0.044	1.334	0.182	Insignificant
H1 _b	GINMSE => Prof	1.045	0.07	0.04	1.749	0.08	Insignificant
H1 _c	GINMSE => Emp	1.045	0.124	0.052	2.404	0.016	Significant
H2 _a	GINBU => Sales	1.077	0.273	0.047	5.753	0	Significant
H2 _b	GINBU => Prof	1.077	0.212	0.04	5.25	0	Significant
H2 _c	GINBU => Emp	1.045	0.11	0.046	2.393	0.017	Significant

Note: GINMSE = Government incentives to indigenous innovators/sellers; GINBU = Government incentives to buyers; Prof=Profitability, Emp = employment level; β = Multiple correlation coefficients VIF = Variable inflation factor; SE = Standard Error

5.3 Government incentives to firms (GINMSE) and innovation performance

The direct effect of incentives to firms on performance in the commercialisation of indigenous innovation was assessed with the guidance of hypotheses (H_{1a}, H_{1b} and H_{1c}, and) (figure I). For government incentives to firms (GINMSE), the standardised path coefficients and their p-values and t-values only exhibited positive effects on firm-level employment and is rather insignificant sales and profitability at a 5% significant level (Table V and Fig III). Thus, from the model result, a hundred *per cent* improvement in government incentives to firms, *ceteris paribus*, could increase their employment level by about 12.4% and pro. Therefore, hypotheses H_{1a} and H_{1b} on positive effects of GINMSE on sales and profitability are respectively rejected, while hypothesis H_{1c} that GINMSE is positively related to firm-level employment level is accepted.

5.4 Government Incentives to buyers GINBU and firm performance

Similarly, the direct effect of incentives to buyers of indigenous innovation (GINBU) on firm performance in the commercialisation of indigenous innovation was assessed via hypothesised paths H_{2a}, H_{2b}, and H_{2c} (figure II). Evaluation of the structural model revealed that at a 5% significant level GINBU has positive effects on all the firm performance metrics of sales, profitability and employment. The results imply that doubling government incentives to buyers of indigenous *ceteris paribus* could increase sales by about 27.2 %, profitability by about 21.2%, and level of employment by about 11%. Therefore, Hypotheses H_{2a}, H_{2b}, and H_{2c} are all accepted.

5.5 Testing Moderating Effects of Government Incentives on Firm Performance

The study considers factors such as market factors as the main drivers of successful commercialisation of indigenous innovations (Kharub et al., 2019; Anderson, 2020) and believes government incentives play some direct or moderating roles in the impact of drivers on successful commercialisation (Olcay and Bulu, 2015; Carboni, 2017). The study, therefore, tested the direct effects of government incentives, effects of market factors, and the moderating effects of government incentives on the link between market factors and indigenous innovation and overall firm performance. The path results are presented in Table VI below

Table VI: Testing the moderating effects of government incentives on firm performance

Hypotheses	Path	β	SE	t-values	pvalues	Significance at 5%	$R^2(Q^2)$
H3	MktF. => Inno. Perf.	0.467	0.036	13.09	0	Significant	0.360 (0.150)
H4a	GINMSE => Inno. Perf.	0.075	0.046	1.627	0.104	Insignificant	
H4b	GINBU => Inno. Perf.	0.267	0.057	4.672	0	Significant	
H5a	MktF*GINMSE => Inn. Perf.	0.068	0.037	1.855	0.064	Insignificant	
H5b	MktF*GINBU => Inn. Perf.	0.162	0.052	3.117	0.002	Significant	

Note: GINMSE = Government incentives to indigenous innovators/sellers; GINBU = Government incentives to buyers; MktF=Market factors; Inn.Perf. = Indigenous innovation performance; β = Multiple correlation coefficients VIF = Variable inflation factor; SE = Standard Error; R^2 = model predictive power; Q^2 = model predictive power

The model exhibited adequate predictive relevance ($Q^2 = 0.150$) and power ($R^2 = 0.36$). Thus, the model accounted for about 36% of the variations in the successful commercialisation of indigenous innovations. Based on the R^2 and the Q^2 statistics, the PLS structural model has moderate explanatory power and satisfactory predictive relevance. It is evident from the result that at 5% significance level, market factors significantly drive commercialisation of commercialisation and MSE performance by about 46% ($\beta = 0.467$; $SE = 0.036$; $t = 13.09$; $p = 0.000$). GINMSE has insignificant direct and moderating effects on overall firm performance. GINBU, on the other hand, has strong significant positive effects (26.7% direct effects and 16.2% moderating effects on market factors) on overall firm performance. Hypotheses H3, H4b, and H5b are therefore accepted while H4a and H5a are rejected.

6. Discussion

The paper aims to examine the effects of both demand-side and supply-side incentives on the commercialisation of indigenous innovation and three key dimensions of firm performance to profess appropriate strategies to promote indigenous innovation in low-income economies. From the PLS-SEM path testing, incentives to firms have insignificant effects on sales and profitability and only have significant positive effects on employment. The direct effects of GINMSE on overall firm performance, as well as its moderating influence on market factors, are also insignificant. These findings are broadly consistent with the mixed evidence from the literature (Zhang and Wu, 2014; Sabatini-Marques *et al.*, 2015; Huergo *et al.*, 2016). Zhang and Wu, 2014; Guan and Yam, 2015; Carboni, 2017; Yigitcanlar *et al.*, 2019). Yigitcanlar *et al.* (2019), for example, recently provided some evidence that while firms perceive direct incentives as critical for their performance, incentives have only marginal effects on fostering innovation.

The current finding seems inconsistent with some of the evidence on Ghana (Amankwah-Amoah and Sarpong, 2015; Udimal *et al.*, 2019). The revelation is, however, supported by the facts on the ground. The reality on the ground is that the Government mostly spins about having instituted incentive schemes for small businesses. However, other evidence suggests that the budgetary

allocations for these incentive programmes are woefully inadequate, and the programmes are often plagued by corruption and political cronyism (Quaye et al., 2020).

On the demand side, the model results revealed that government incentives to buyers (GINBU) have significant positive effects on all the performance metrics. Again, GINBU has a relatively high moderating influence on market factors and direct effects on overall firm performance. The overwhelming significant positive influence of GINBU on the performance of indigenous innovation observed in the study backs up the emerging views (Mersky et al., 2016; Zhang, 2016; Narassimhan and Johnson, 2018) that advocate more demand-side incentives. This finding also confirms the BRI view, emphasising consumers' reduced cost of using innovation as crucial for successful commercialisation

Policy implications

The findings and insights offered by the study have important implications for policymakers in Ghana and other developing countries. It is clear from the strategic posture of the Government of Ghana that it recognises the importance of indigenous innovation (UNIDO, 2015; MESTI, 2017; Quaye et al., 2019). However, despite nice policy crafts, there is no evidence of a well-functioning national innovation system or vibrant indigenous industries. SMEs engaged in the commercialisation of indigenous innovative industrial activities face slow growth and high failure rates (Tsatsenko, 2020; Atta-Ankomah et al., 2021). This research has shown that through improved market factors and or government incentives, the outcome of indigenous innovation and firm performance could be effectively improved in the small-scale industry in Ghana. It demonstrates that government incentives to firms have mixed effects, and incentives to buyers have a significant impact on indigenous innovation and the key dimensions of a firm's performance.

The current study provides confirmatory evidence of the mixed effects of government incentives on indigenous innovation and firm performance. Yet, it also provides evidence of significant links between incentives and employment levels. This evidence, together with other evidence and the fact that innovations do not initially generate strong and stable cash inflows (Oderanti et al., 2021), implies that better strategies for government incentive schemes are required. This is particularly important for firms in Africa operating in resource and income-constrained environments (Tiwari et al., 2014). There is, indeed, increasing evidence of incentive schemes for small businesses in Ghana and other low-income economies. However, it is not just the policy per se. It is when MSEs successfully access funds, widely apply them and commercialise indigenous knowledge that the country will benefit. For the commercialisation of indigenous innovation, firms require cheap, patient, long-term, and flexible capital, which will not erode profitability and increase risk. Therefore, instituting innovation development grants and steering policy banking that directs low-cost, long-term, and flexible credit to firms commercialising indigenous innovation can address some of the challenges in the SSI (Atiase, Mahmood, and Wang, 2019).

Other evidence (Nyarku and Oduro, 2017; Johnson, 2018) also suggests regulatory voids and the associated excessive cost burden and deadweight losses are perhaps limiting the expansion and profitability of innovative indigenous activities and increasing the risk even for firms that have accessed financial incentives. Therefore, where appropriate, there should be regulatory relaxation

as well as the institution and integration of regulatory incentives to enable MSEs to comply without losing too much.

On the demand side, the current study provides strong evidence of a significant positive effect of incentives to buyers on firm performance. Impliedly, STI policy needs to be more robust on promotion and demand legitimisation of indigenous innovation to improve acceptability. There is a need to push for more local content policies and institute more demand legitimisation programmes. Incentivising private firms and individuals to buy indigenous innovation can increase demand and enhance commercialisation. Indigenous innovation can be boosted if, for example, there is a policy encouraging the use and celebration of at least one indigenous innovation at every public event and also at a private event.

It is evident from the empirical analysis and on the ground that weak demand and competitiveness are the main constraints, and government purchase has positive impacts. Therefore, requiring through policy, for example, that public institutions dedicate a percentage of their budgetary spending on procurement of some approved indigenous innovations can help improve demand, reduce the commercialisation gap and further stimulate indigenous innovation and its commercialisation. Furthermore, using government incentives and other government programmes to promote new business models that expand values and demand is sensible. A utility and affiliate model scheme, for example, in which some selected indigenous innovations are made available in a system to public institutions and some large companies to use as and when needed, with the government guaranteeing bill payment, can help improve value creation and expand sales of indigenous innovations. Again, using policy banking to create and ring-fence low-interest or interest-free loans to indigenous innovation buyers, for example, can improve both demand and supply of indigenous innovation.

The empirical analysis also suggests the moderating or combined effects of government incentives and improved market opportunities have a highly positive influence. This implies that improving market conditions for indigenous innovation through government incentives should be an essential part of STI and industrial policies in Ghana. Because high packaging costs and poor finishing are clear barriers to commercialisation as evident on the ground in the Ghanaian SSI sector, government support for investment in packaging technologies can also help cut costs, improve finishing quality, and address the competitiveness challenges of indigenous innovation.

Managerial implications

From a managerial and firm strategy standpoint, there is some recognition that many of the constraints faced by firms commercialising indigenous innovation stem from inefficient regulatory compliance processes and procedures. The current findings of significant positive links between incentives and successful innovation commercialisation imply that government intervention is, overall, a two-edged sword in general. It both creates opportunities and burdens for the commercialization of indigenous innovation. On one hand, the overwhelming positive links between government incentives and improved firm performance in the commercialisation of innovation call for increased government intervention. However, because of potential

inefficiencies caused by government intervention, MSEs should constantly use their trade associations to lobby against regulatory burdens and advocate for market-enhancing incentives.

MSEs' managers, on the other hand, must constantly scan for incentives and opportunities arising from government policies and strategize to take advantage of them, as some of the opportunities can be non-obvious. Opportunities from demand-side incentives can be particularly nonobvious, and firms must strategize to harness the benefits (Ahmad et al. 2018; Crick et al. 2021) . For example, improvements in the payment system and increased availability of consumer credit as a result of government policy can help SMEs effectively sell more to people everywhere, collect payments on time, and reduce risks, but MSE managers must strategize to reap the benefits.

7. Conclusion

In conclusion, the study has achieved its main aim of examining the effects of both demand-side and supply-side incentives on the commercialisation of indigenous innovation and firm performance. The inference from the findings is that, firstly, the impact of government incentives on the demand side is more effective than incentives on the supply side even though incentives to buyers are less common on the ground. Secondly, it can be concluded that, despite the constraints, overall government incentives can have a substantial influence on the performance of indigenous innovation among firms in the Ghanaian small-scale industry. Based on the findings of the current study and other facts on the ground, government incentives are required for most indigenous innovations to be successfully commercialised. Incentive schemes and strategies should focus more on the demand side and not be over-focused on firms as currently in countries such as Ghana.

Methodologically, the main limitation of the study is that the objective data used in the study were self-reported, where respondents gave their assessments of their innovation performance. However, it is believed that MSE owners would reflect better on their realities when doing subjective assessments. Although this study is novel in employing PLS-SEM to test the effect of supply and demand-side incentives on the successful commercialisation of indigenous innovation, in terms of the research setting, it used a case study approach, selecting samples from a single region and the Ghanaian SSI sector. Future studies could expand the research to the whole economy to improve generalizability. Again, future studies could embark on a cross-country or comparative analysis to improve geographical generalizability.

Furthermore, the current analysis appears to favour demand-side incentives, even though the study is more supply-side in nature, as it measures the effects of government incentives on successful commercialization from the perspective of firms. Further research should extend the model to include the views of buyers, distributors and policymakers. Understanding the reasons for the purchase and widespread adaptation from the demand side can provide more insights into the myriad of issues in the commercialization of innovation, particularly in Africa where the literature is scarce (Atiase and Dzansi, 2020).

Moreover, the study followed earlier research (Mayer, 2018; Yigitcanlar et al., 2019) that called for better delivery strategies for government incentives. Although the current study distinguished between supply-side and demand-side incentive strategies and called for an entire value chain and more demand-side incentives, from the literature, appropriate policies and delivery methods for government incentives is a difficult challenge. Therefore, there is a need for further research to provide an understanding of different incentives and effective strategies for supporting innovation commercialisation. Finally, the impact of the COVID-19 crisis on both global supply chains for

innovators, particularly MSEs, and domestic demands as well as government interventions is difficult to predict and should therefore be of interest for further research.

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