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The influence of the manager on firm innovation in emerging economies.

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Abstract

The focus of this paper is on the relatively under-researched area of the influence of management on innovation activities for firms in emerging economies. Many emerging economies adopt a strategy of outward-oriented development with the aim to enhance innovation performance through FDI and international trade. However, attention should be paid to firm mechanisms, including intangibles, that may enable a firm to benefit from the more tangible performance-enhancing effects. It is through such a lens that we examine firm innovation in emerging economies, focusing on how variations in management experience, management practices and management incentives impact innovation performance.

We employ a production function approach to identify the effect of the management environment on innovation diversity for firms in emerging economies. Our diversity of innovation measure takes account of five types of innovation activity, and is indicative of the degree of 'innovativeness' that the firm possesses. A Tobit estimation technique is employed.

Innovation decisions typically involve managers as filtering mechanisms to consider a range of external and internal factors that enhance the likelihood of innovation outcomes. Our results indicate that management experience, management practices and management incentives are all important in determining innovation activities in firms from emerging economies.

Our analysis reveals the importance of the management environment in explaining innovation differences at the level of the firm in emerging economies. Therefore, strategies to empower and support managers in emerging economies should be considered alongside outward-orientated development strategies.

1. Introduction

Innovation is identified as a critical component for business productivity and economic growth (Schumpeter, 1934; Romer, 1990). Schumpeter (1934) argued that the catalyst to innovation is the transformation of knowledge combinations into new products or processes. In recent years, a notable trend in the manufacturing setting is the move away from price competition to innovation-driven competition (Santamaría et al., 2012; Anthony et al., 2008). Evidence suggests that industry leaders stay ahead of their competitors due to their capabilities to adapt and transform, as well as setting up infrastructure and culture that allows innovation to flourish (Anthony et al., 2008; Garud et al., 2011). Increasingly, innovation is regarded as the growth engine for all businesses (Anthony et al., 2008); with considerable research undertaken to explain why some firms are more likely to innovate. Firm characteristics, such as size, sector and ownership, and geography all have been identified as influential drivers of innovation output (Audretsch and Feldman, 1996; Boschma, 2005; Crowley and McCann, 2015 Gordon and McCann, 2005; McCann and Simonen, 2005; Tether, 1998; Romer, 1990; Roper et al., 2008). There is also a growing body of evidence suggesting that the adoption and implementation of human resource practices, automated manufacturing technologies and quality improvement initiatives positively influences firm innovation outcomes (Bourke and Roper, 2015; Bourke and Roper, 2016; Crowley and Bourke, 2016; Beugelsdijk, 2008; Chen and Huang, 2009; Hung et al., 2011; López-Mielgo et al., 2009; Terziovski and Guerrero, 2014; Zeng et al., 2015). Although our knowledge of the drivers of innovation is by now substantial, innovation remains a risky undertaking (Leiponen and Helfat, 2010; Reid and de Brentani, 2010; Rosenbusch et al., 2011) requiring effective planning and management (Anthony et al., 2008; O'Shea, 2002).

The importance of the individual, their characteristics and experience, in steering innovative decision-making form the theoretical foundations in this area. Rogers (2003) highlighted the importance of 'change agents' and 'opinion leaders' for knowledge-sharing and overcoming resistance to new ways of doing things. Karshenas and Stoneman (1993) also deem the characteristics of the decision-maker important in terms of weighing up the costs and benefits of a particular course of action, although they consider the decision to be made at the level of the firm. Scholars like Tornatzky and Fleischer (1990) developed a framework for understanding innovation success by considering the technological context, the organisational context and the environmental context in such decision-making. There is also a growing understanding of how cumulative learning experience from previous innovation decisions influence subsequent ones (McWilliams and Zilbermanfr 1996).

Recent work on innovation in emerging economies demonstrates the importance of the environmental context, such as industrial R&D (Liu and Buck, 2007; Wei and Liu, 2006 ; Wang and Kafouros, 2009), international trade (Liu and Buck, 2007; Wei and Liu, 2006) and foreign direct investment (FDI) (Liu and Buck, 2007; Wei and Liu, 2006). Not surprisingly, many emerging economies adopt a strategy of outward-oriented development with the aim to enhance innovation performance through FDI and international trade. Wang and Kafouros (2009) caution against an over-reliance on such policies as the benefits and impacts of FDI, exports and imports on innovation are moderated by a number of factors. They advise that more attention should be paid to mechanisms that may enable a firm to benefit from these performance-enhancing effects.

This study focuses on the organisational context as an important support for innovative activities (De Brentani and Kleinschmidt, 2004; Koc and Ceylan, 2007, Tornatzky and Fleischer (1990)). Management commitment is a key element to creating innovative environments in firms, often acting as a catalyst in innovation processes (De Brentani and Kleinschmidt, 2004; Daellenbach et al., 1999; Kleinschmidt et al., 2007). Previous studies report the positive influence of innovation strategies and information-sharing on innovation performance (Cuijpers et al., 2011; Peeters and Van Pottelsberghe, 2006), as well as the importance of culture (Hogan and Coote, 2014) and leadership in shaping firms' innovation outcomes (Love and Roper, 2015; Garcia-Morales et al., 2012). In this paper we explore the influence of the organisational context on innovation outcomes. In line with the importance innovation theorists (Rogers,2003, Tornatzky and Fleischer,1990, Karsehnas and Stoneman, 1993, McWilliams and Zilbermanfr, 1996) placed on the individual and the organisational context in shaping innovation decision-making, our analysis of firm innovation in emerging economies centres on the *manager*.

In addition, we add to a very limited literature on firm innovation activity in emerging economies. To date, the innovation literature has predominantly focused on the innovation propensity of firms in developed economies. In the past, firms in emerging economies, such as Brazil, Russia, India and China, played a secondary role in the global innovation context. However, such firms have begun to catch up in developing their own innovative capabilities, with some now considered major players in certain sectors, such as mobile communications, electronics and information technology (Mathews, 2002). Indeed, while many multinational companies operating in these regions previously chose to retain R&D activities at company headquarters; they are now increasingly globalising their R&D activities. The upshot of such a shift was a dramatic increase in the number of patents issued to firms – both indigenous and

MNCs - in emerging economies (Gassmann and Han, 2004; Hicks, 2005). Recent GE Global Innovation Barometers report that executives in emerging economies embrace innovation practices and recognise innovation as a top executive priority. The most recent GE Innovation Barometer reports that executives in emerging economies are feeling more optimistic, citing less difficulty finding disruptive ideas than their peers in developed economies. In addition, governments in emerging economics are seen to be doing more to support innovation (GE Global Innovation Barometer, 2016).

The data used in this paper is taken from the most recent Business Environment and Enterprise Performance Survey (BEEPS) in 2013. BEEPS data is particularly useful as it has detailed information on various innovation and management indicators, whilst also containing information on firm characteristics and location information. We employ a tobit estimation as we examine the influence of the manager on the diversity of innovation (Love *et al.*, 2011) within the firm. The measure is a share of innovation which is indicative of the degree of 'innovativeness' that the firm possesses and also controls for the endogenous relationship inherent with innovation activities. The measure takes account of five types of innovation activity (i.e. R&D spending, new to firm product, new to market product, process and marketing).

There is a considerably small literature developed on the determinants of firm innovation in emerging economies (Bourke and Crowley, 2015; Zupan and Kase, 2005). And, from this small body of literature – our understandings on the influence of managers and the human resource management function for innovation in firms from emerging economies is even less

developed. Hence, this paper is contributing to the literature by examining the determinants of firm innovation in emerging economies, with a particular focus on how variations in management experience, management practices and management incentives impact innovation performance.

The paper proceeds with a discussion of the literature on management characteristics and our proposed hypotheses in the next section. This is followed by a data and methodology section. The next section focuses on the results of our hypothesis testing. A conclusions and discussion section completes the paper.

2. Literature Review & Hypothesis Development

It is generally accepted that a firm's ability to innovate resides in the knowledge, skills and abilities of its employees (Roper et al., 2008) and management plays an important role in shaping the firm's human capital. Creativity is enhanced if employees are exposed to a broad range of perspectives and information (Nonaka and Takeuchi, 1995), and the importance of information sharing and knowledge sourcing activities is well documented in the innovation literature (He and Wong, 2012; Love et al., 2011). Management can change structures and systems to facilitate inter-departmental and external collaborations which have been shown to positively influence innovation performance (Cuijpers et al., 2011; He and Wong, 2012). A workforce with diversity in skills, knowledge and experiences increase the possibilities for new combinations of internal knowledge through interaction and learning and the ability to exploit knowledge from external sources (Østergaard et al., 2011; Cohen and Levinthal, 1990), indicating the importance of encouraging collaboration and networking. In addition, practices which empower employees enabling them to address problems and opportunities

that arise contemporaneously foster exploratory learning, creativity and innovation (Lepak and Snell, 1999; Kang et al., 2007; Drucker, 1999). Managers may make changes to general production or supply operations, such as the introduction of advanced manufacturing technologies, which have been shown to influence innovation performance (Abrunhosa and Moura E Sá, 2008; Santos-Vijande and Álvarez-González, 2007; Hewitt-Dundas, 2004). In addition, managers may strategically outsource particular business activities, obtaining economies of scope within the innovation process (Love and Roper, 2001).

In the business literature, studies differ in terms of defining and/or operationalising management – some focus on CEOs, some on 'senior managers', while others focus on the top management team (TMT). Notwithstanding differing definitions, most agree that managers are the key gatekeepers of firms' information processing and strategy-making as they interpret the environment, give sense to internal and external constituents, and steer strategy through their resource allocation choices (Heyden et al., 2015). Numerous studies have examined how management characteristics and management incentive structures influence firm performance. Goll et al. (2008) demonstrated how management characteristics impact on business strategy and related performance outcomes in the airline industry. A study of US manufacturing firms reported how different top management team (TMT) characteristics impact R&D investments, with TMT age and tenure playing a particularly influential role (Heyden et al., 2015). Wong (2013) reports that management involvement in innovation has a positive influence on innovation outcomes, specifically on organisational innovation; and this influence propagates and contributes to the success of technical innovation. (Balkin et al., 2000), in an examination of the link between CEO pay and innovation in high technology firms, reported that CEO short-term compensation was related to innovation as measured by number of patents and R&D spending.

Management experience

Drawing on Hambrick and Mason's (1984) upper echelons theory, a large body of work has focused on senior management team members and their influences on firm outcomes. The upper echelons perspective suggests that demographic characteristics of managers act as proxies of their cognitive base and values which in turn influence strategy and firm performance (Goll et al., 2008). For instance, younger managers may be more willing to undertake novel and unprecedented strategies, whereas older managers are likely to be more risk averse (Goll et al., 2008). Some studies report that greater organisational tenure leads to less strategic change and innovation (Bantel and Jackson, 1989; Miller, 1991), whereas the level of education of the senior management team benefits innovation (Bantel and Jackson, 1989). In addition, empirical evidence suggests that heterogeneous management teams lead to greater creativity and innovation (Bantel and Jackson, 1989), with the proportion of technical managers reported as a positive influence for innovation (Daellenbach et al., 1999). Heyden et al. (2015) also report that the functional experience of the management team has a direct positive effect on R&D intensity. Daellenbach et al. (1999) report that a CEO's openness to innovation, measured by company/industry experience, functional background and formal education positively influences a firm's commitment to innovation.

Rogers (2003) recognised the importance of individual characteristics to innovation decision-making. While empirical studies lack consensus as to which individual characteristics are of most importance for successful innovation, with more opportunities to learn from previous decisions, successful and otherwise (McWilliams and Zilbermanfr, 1996), we anticipate that management experience will benefit innovation activities within firms, i.e.

H1: Management experience positively influences innovation performance

Human resource management practices

Next, we turn to the organisational context. There is a growing body of evidence highlighting favourable innovation outcomes for firms with human resource management (HRM) practices, such as performance appraisal (Chen and Huang, 2009; Jaw and Liu, 2003; Jiménez-Jiménez and Sanz-Valle, 2005), multi-functional teams (Gupta and Wilemon, 1996; Hipp and Grupp, 2005; Nakata and Im, 2010; Tidd and Bodley, 2002), networking opportunities (Roper, 2001), job autonomy (Beugelsdijk, 2008), systems which encompass general production or supply operations (Abrunhosa and Moura E Sá, 2008; Santos-Vijande and Álvarez-González, 2007; Hewitt-Dundas, 2004), and outsourcing (Love and Roper, 2001). Recently, some authors have highlighted the complementarity between such management practices. Indeed, a crucial element in firms' strategic decision-making is the identification and effective harnessing of complementarities between different managerial activities, optimising resource use (Milgrom and Roberts, 1990). There is no one or two 'magic' HRM practices that will stimulate worker and business performance but rather complementary bundles of HRM practices give rise to superior output and quality performance (Bratton and Gold, 2012). Within the innovation literature, authors have identified the value of 'bundling' different management practices for innovation. For example, Laursen and Foss (2003), in a study of Danish manufacturing businesses, report that HRM practices positively influence product innovation when applied together. A study of firm innovation in transition economies reported that complementary HRM practices positively influence innovation output relative to no HRM practices (Bourke and Crowley, 2015). In addition, (Crowley and Bourke, 2016) report that HR practices are significantly more effective when implemented as 'bundles' or 'systems' of complementarities than when they are implemented individually in Irish manufacturing and service firms. Building on previous work (Crowley and Bourke, 2016; Bourke and Crowley, 2015; Laursen and Foss,

2003), we expect firms that introduce a broad range of management practices, i.e. management practice diversity, to benefit innovation performance. In summary:

H2: Management practice diversity positively influences innovation performance

Management incentives

Within the organisational context, firms can incentivise workers and managers which in turn benefits firm performance. Agency theory emphasises the risk attitudes of principals and agents. Agents are assumed to be risk-averse as their employment security and income is tied to one firm; whereas principals are assumed to be risk neutral as they can diversify their shareholdings over a number of firms (Balkin et al., 2000). Corporate governance faces the challenge of setting up incentive structures that align agent's (managers) risk orientation with the interest of the principals (shareholders) and the overall objectives of the firm (Makri et al., 2006). Agency theorists continue to debate whether incentive based pay can achieve such risk orientation. One side argues that outcome based incentives "align the interest of executives with shareholders, motivate appropriate risk taking and promote a long term orientation" (Sanders and Hambrick, 2004).

The other side highlights the potential for negative consequences of incentives, in that they induce executives to make decisions designed to reduce personal risk rather than maximise performance. Recent empirical studies show how monetary incentives positively influence innovation performance in firms. (Makri et al., 2006) used a sample of 206 publicly traded firms from 12 U.S. manufacturing industries to examine the relationship between CEO incentives, innovation and performance in technology intensive firms. They reported that aligning CEO incentives with science harvesting has a significant effect on market

performance. In addition, a study of high technology firms reported that CEO short-term compensation was related to innovation as measured by number of patents and R&D spending (Balkin et al., 2000).[1] Therefore we expect that a monetary incentive structure for managers will have positive influence on a firm's innovation outcomes. This implies:

H3: Management monetary incentives positively influence innovation performance

3. Data & Methodology

The data source for the empirical analysis in this paper comes from the fifth series of the Business Environment and Enterprise Performance (BEEPS) survey. This survey is jointly conducted by the World Bank and the European Bank for Reconstruction and Development. Face to face interviews are conducted with managers to examine the quality of the business environment. The fifth series was the first series of the BEEPS survey to include a detailed module looking at the firms' innovation activities and management/organisational practices. In total, there were almost 16,000 enterprises surveyed across 30 emerging economies. BEEPS covers manufacturing, construction and most service sectors (wholesale, hotels, restaurants, transport, storage, communications, IT and the retail sector). In some larger economies, there are other subsectors included in the sample where they make a larger contribution to employment and added value in those economies. State owned firms are not included in the sample.

[Insert Table 1 about here]

[1] It is important to note that this relationship was not evident in low technology firms.

Table 1 provides details and descriptive statistics for the sample of firms included in our analysis. In this analysis, only firms that were designated medium or large are included allowing a sample of 6,185 firms for analysis. This includes firms with 20 or more employees where large firms are categorised as having 100 or more employees. The innovation intensity measure employed is an index of innovation activity which ranges from 0-100. The index is equal to 100 if the firm has introduced all five binary measures of innovation incorporated in the survey which included whether the firm spent on R&D, had a new to firm innovation, new to market innovation, process innovation and/or a marketing innovation, in the previous three year period[2]. If a firm only introduced four types, their index is equal to 80. If they introduced three types, their index is equal to 60 and so on so forth. As can be identified in Table 1, the average innovation intensity is 22 per cent indicating that the level of innovation activity is quite low for medium and large firms in emerging economies This indicates that firms *on average* are only introducing one from five forms of innovation activity. However, in reality this percentage is low because most firms are not engaging in any innovation activity - with 59 per cent of the sample reporting zero levels of innovation activity. The percentage of firms engaging in HRM changes (represented by the management practice diversity measure) is also quite low – with 80 per cent of the sample not introducing any form of HRM change. This indicates that the propensity to introduce organisational changes is quite low for firms in emerging economies. The management practice diversity measure is developed from a set of questions from the survey that asks the firm representative if the establishment introduced new or significantly improved management practices in the areas outlined in Table 2, over the previous three years, for the first time. They answered a binary yes or no to whether the six management practices were introduced. The list of questions on management practices in the survey include the aspects of management practices discussed

[2] These are standard innovation questions and are similar to the OECD definitions and description of innovation.

in the literature review around changes to do with networking opportunities, job autonomy, outsourcing and general production or supply operations. An index is then formulated for each firm which takes a value between 0 and 100 depending on how many management practices they introduced.

The average number of years of management experience of the top manager is 18 years. 29 per cent of the sampled firms have an internationally recognised management quality certificate. 16 per cent of firms have a female manager as their top manager. The structures of incentives in place to incentivise managers are quite low with 76 per cent of firms having no performance bonus for managers in place. 46 per cent of firms in the sample are manufacturing, 29 per cent of firms are located in capital cities or cities over one million, 21 per cent export and 7 per cent are foreign.

We employ a production function framework to identify the effect of the management environment on innovation diversity for firms in emerging economies which can be represented as:

$$\text{Innovdiversity}_i = \beta_0 + \beta_1 \text{Management indicators}_i + \text{FC}_i + \varepsilon_i \quad (1)$$

In equation (1), innovation diversity is a function of a vector of management indicators (manager experience, quality management certification, manager gender, management incentive structure and management practice diversity) and a vector of firm characteristics (education of workforce, firm size, origin of firm, whether the firm is part of a multiplant or not, firm type and whether the level of urbanization of the firm's location).

As hypothesised in the theoretical section, we expect management experience, management incentives and management practice diversity to have a positive effect on innovation. Modern

firm level surveys generally collect information on innovation activity and outcome proxies such as R&D spend, patents activity, discrete dummy variables on product and process indicators and innovation sales performance. Innovation studies have predominantly employed discrete dummy variable measures of product or process innovation (Griffith *et al.*, 2006, Parisi *et al.*, 2006, Van Leeuwen and Klomp, 2006), or innovation sales per employee (Lööf and Heshmati, 2006), and innovation sales share of total sales (Crepon *et al.*, 1998, Van Leeuwen and Klomp, 2006) in their analysis. A problematic feature of most innovation studies is that each firm innovation outcome is normally analysed independently of other firm innovation indicators. The theoretical literature (Gordon and McCann, 2005) and findings from the empirical economic literature (Doran, 2012) suggest that making distinctions between innovation outcomes is difficult as R&D activities and new technological and non-technological processes can allow new products to be developed, and mass production of successful new products may require new process innovations and further R&D investment. Hence, the relationship between innovation activities (inputs and outcomes) are likely to be dependent and endogenously related to one-another. We therefore propose an index measure of innovation performance used by Love *et al*. (2011) that takes into account the diversity of all innovation activities within the firm. This measure has an upper and lower bound suggesting the use of a Tobit model (Love *et al*. 2011). We believe that the diversity of innovation measure employed in this paper is superior to the traditional binary measures of innovation that dominate the empirical literature. This is due to the fact that the diversity of innovation measure is a share of innovation which is indicative of the degree of 'innovativeness' that the firm possesses. The measure takes account of five types of innovation activity (i.e. R&D spending, new to firm product, new to market product, process and marketing).

4. Results

In terms of internal firm differences, most studies have taken a resource based view of the firm, where innovation stems from the firm's core competences (Vega-Jurado et al., 2008). The core competencies can be tangible and intangible and are acquired and developed over time (Vega-Jurado et al., 2008). As discussed, the predominant focus of this paper is on the intangible managerial competences of the firm. The results of the analysis are presented in Table 3. Returning to the first of our three hypotheses, the coefficient on our predictor variable of management experience is positive and significant at the 5 per cent level substantiating our first hypothesis that management experience positively influences innovation performance. This finding is in line with Heyden et al. (2015) that functional experience of the management team has a positive effect on innovation (Daellenbach et al., 1999). The finding contradicts the view that more experienced managers are more risk averse and not willing to undertake novel and unprecedented strategies (Goll et al., 2008). Individual-level experience matters for innovation within firms (Rogers, 2003); and managers with greater experience are likely to have learnt from previous decisions concerning innovation (McWilliams and Zilbermanfr, 1996).

The coefficient on management practice diversity also has a positive and significant effect on innovation performance. This is not surprising as the limited literature examining the relationship between management practices and innovation has consistently reported that management practices are important for innovation (Laursen and Foss, 2003; Bourke and Crowley, 2015; Crowley and Bourke, 2016). This is further evidence of the importance of the organisational context for innovation (Tornatzky and Fleischer, 1990).

And lastly, all four management incentives are significant and positive relative to having no performance bonuses which substantiates our third hypothesis that monetary management incentives will positively influence innovation performance. This result indicates that managers are willing to take risks with innovation activities despite the uncertain outcomes inherent in such activities. The assumption that agents are assumed to be risk-averse (in principal-agent theory) as their employment security and income is tied to one firm appears a less credible argument, *at least* in terms of innovation activities of firms in emerging economies when incentives are present. Incentive structures for managers matter for innovation in emerging economies; further evidence of the importance of the organisational context in shaping innovation success.

We now turn our attention to the control variables in our model. We used the education level of workers within the firm as an indicator of the firm's stock of knowledge (Hong et al., 2012) We identify that firms with more educated workers are more likely to innovate. This is not surprising as it has long been regarded that investments in human capital are a crucial driving factor in a firm's innovative performance (Romer, 1990; Griliches, 1998). There now seems broad agreement that exporting businesses in developed economies are more innovative (Hashi and Stojčić, 2013; Becker and Egger, 2013; Cassiman et al., 2010; Love and Roper, 2015). In line with this literature, we also find that exporting firms are also more likely to innovate in emerging economies. Further, given the sample of this paper is from emerging economies, it is important to report on the influence that foreign direct investment (FDI) may be having on the innovation activities of firms in this special type of economy. Empirical evidence indicates that foreign-owned firms generally outperform domestically

owned firms and exhibit large and persistent productivity and innovation differences (Dachs et al., 2008; Bellak, 2004). We identify that foreign firms are significantly more likely to introduce innovations, relative to their domestic counterparts. Furthermore, the average index for introducing management practices for foreign firms is 21, relative to that of a figure of 13 for domestic firms. The results from this study support the existing body of evidence that foreign firms have a profound influence on innovation activities in these types of economies. A further stylised fact in the literature is that manufacturing firms are more likely to innovate as services are often viewed as passive adopters of technology and are often referred to as being "users of technology" (Evangelista, 2000; Tether, 2005). Hence, it is not surprising that manufacturing firms are also more likely to innovate in emerging economies – mirroring evidence from developed economies. We also find a negative relationship for female managers and innovativeness, albeit at a 10% level of significance. In addition, management of quality improvement is considered a vital component of business strategy (Adam et al., 2001); with many empirical innovation studies indicating that quality certification, such as ISO9000, positively influences innovation outcomes (Benner and Tushman, 2002; Pekovic and Galia, 2009). Likewise, our analysis reveals the positive influence of quality certification on firm innovation outcomes in emerging economies.

5. Discussion and conclusions

Over the past half century, academics interested in innovation around the world have produced a considerable body of literature on innovation studies that have led to a much improved understanding of how innovation happens. Firm characteristics and economic geography are two areas that have been identified in explaining innovation differences at the firm level. The focus of this article is on the influence management – both individual experience and the organisational context -has on innovation at the firm level.

In particular, we focused on the influence of the manager through firm survey observations of management experience, management practice diversity and management incentives and their effects on the intensity of innovation diversity in firms from emerging economies. Innovation decisions typically involve managers as filtering mechanisms to consider a range of external and internal factors that enhance the likelihood of innovation outcomes (Daellenbach et al., 1999). Consequently, we expected that managers will be influential in explaining innovation outcomes.

In our study, the experience of managers was identified as being significant in explaining innovation. This finding is not altogether surprising as we know individuals shape adoption decisions (Rogers, 2003) and we would expect managers that have spent a longer time in a particular industry to have enhanced knowledge of technological trends and be in a better position to make the necessary decisions to capitalize on innovation opportunities (Daellenbach et al., 1999). However, it is important to note that our study focused on the introduction of innovations and not the success of innovations. It has been argued (Tushman and Anderson, 1986) that industry incumbents usually introduce incremental innovations whilst innovations of a more disruptive nature are typically developed by firms from outside the industry. In light of this, it could be argued that firms with more management experience are more likely to innovate, but the nature of the innovation may not be very disruptive to the industry status quo.

Our analysis reveals a similar story in the relationship between management practices and innovation as reported in Bourke and Crowley's (2015) examination of innovation in

transition economies. Managers can directly influence innovation change by introducing management practices and, as identified by Bourke and Crowley (2016) and Arvanitis et al. (2016), there is evidence of a hierarchy of management practices with some practices having a greater impact on innovation performance than others. The ability of managers to identify the appropriate practices that maximise returns for their firm is essential for firm success. Furthermore, our findings not only contribute to the general literature on management practices, but also to the limited conceptual and practical understanding of the influence of the organisational context, in particular management practices, to firm performance in emerging economies (Zupan and Kase, 2005).

Finally, we turn to our finding on management incentives. The poor performance of some privatised firms within emerging economies identifies the importance of and their impact on the performance of firms in emerging economies (Dharwadkar et al., 2000). We could expect that given the uncertainty inherent in innovation decisions that managers would be particularly risk averse when it comes to such decisions. However, incentives for managers clearly matter when it comes to innovation activities. The incentives obviously help dissipate the naturally inherent risk-averse predisposition for managers.

We further reaffirmed a number of stylised facts in the innovation literature, where human capital, exporting firms, and manufacturing firms are all identified as important determinants of innovation diversity for firms in emerging economies. Notwithstanding such important factors, the management environment is clearly a significant factor in explaining innovation differences at the level of the firm**.**

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Table 1: Definitions and Descriptive Statistics of the Variables			
Variables	Description	Mean	SD
Innovation Diversity	An index which takes the value 100 if a firm engaged in all five types of innovation activity (i.e. R&D spending, New to firm product, New to market product, process and marketing), 60 if the firm undertook three different forms of innovation etc	21.78	30.04
Management Practice Diversity	An index which takes the value 100 if a firm engaged in all five types of management practice activity (as per table 2), 50 if the firm undertook three different forms of practices etc	13.35	26.93
Management Experience	Top managers number of years experience working in this sector	17.46	10.26
Female Manager	=1 if the top manager is female, 0 otherwise	0.16	0.37
Quality Management Certificate	=1 if the firm has an internationally recognised management quality certificate	0.29	0.45
Bonus 1	= 1 if based on Manager's own performance as measured by production targets, 0 otherwise	0.08	0.28
Bonus 2	= 1 if based on Manager's team or shift performance as measured by production targets, 0 otherwise	0.06	0.23
Bonus 3	= 1 if based on Manager's establishment's performance as measured by production targets, 0 otherwise	0.06	0.24
Bonus 4	= 1 if if based on company's performance as measured by production targets, 0 otherwise	0.04	0.19
Bonus 5	= 1 if No Performance Bonus, 0 otherwise	0.76	0.43
Rare Dismissal in Company	=1 if firm rarely dismisses or reassigns an under-performing non-manager, 0 otwerwise	0.15	0.36
Education of Workforce	Percentage of the workforce with a third level qualification	34.92	30.26
Medium Sized Firm	=1 if the firm is a medium sized firm, 0 otherwise	0.76	0.43
Large Sized Firm	=1 if the firm is a large sized firm, 0 otherwise	0.24	0.43
Exporting Firm	=1 if the firm is an exporting firm, 0 otherwise	0.21	0.41
Age of the firm	Age of the firm	18.27	13.76
foreign Firm	=1 if the firm is a foreign firm, 0 otherwise	0.07	0.25
Multiplant Firm	=1 if the firm is a multiplant firm, 0 otherwise	0.11	0.31
Construction Firm	=1 if the firm is a construction firm, 0 otherwise	0.09	0.29
Manufacturing Firm	=1 if the firm is a manufacturing firm, 0 otherwise	0.46	0.50
Services	=1 if the firm is a service firm, 0 otherwise	0.45	0.50
City over 1 million	=1 if the firm is located in a capital and a city over 1 million, 0 otherwise	0.29	0.46
City 250k to 1 million	=1 if the firm is located in a city with a population between 250k to 1 million, 0 otherwise	0.31	0.46
City 50k to 250k	=1 if the firm is located in a city with a population between 50 to 1 million, 0 otherwise	0.14	0.35
Under 50k	=1 if the firm is located in a city under 50k, 0 otherwise	0.26	0.44
Under 10K	=1 if the firm is located in a city under 10k, 0 otherwise	0.15	0.35

Source: BEEPS 2013

Table 2: Definitions of Management Practice Type

1	New knowledge management systems to better use or exchange information, knowledge and skills within the establishment
2	Introduction of management systems for general production or supply operations, such as supply chain management systems, lean production, business reengineering, quality management systems
3	New methods for distributing responsibilities and decision making among employees
4	A significant change to the management structure of the establishment, such as creating new divisions or departments, integrating different departments or activities
5	New types of collaborations with other businesses, research organisations or consumers
6	Outsourcing or subcontracting of business activities in production, procurement, distribution, recruiting or ancillary services

Notes:

1. Firms were asked to provide a binary yes/no response when questionned whether or not the firm had introduced any or all of these six management practices for the first time in the previous three years.

Table 3: Management Environment and Innovation Outputs	
Variables	Innovation Diversity
MP Diversity	0.419***
	-0.0113
Management Experience	0.0730**
	-0.0321
Female Manager	-1.602*
	-0.864
Quality Management Certificate	3.616***
	-0.757
Bonus 1	2.638**
	-1.261
Bonus 2	3.705***
	-1.411
Bonus 3	4.395***
	-1.347
Bonus 4	7.855***
	-1.637
Education of Workforce	0.0720***
	-0.0124
Large Sized Firm	1.246
	-0.773
Exporting Firm	3.872***
	-0.85
Age of the firm	0.0162
	-0.0235
Foreign Firm	2.707**
	-1.245
Multiplant Firm	0.189
	-1.022
Construction Firm	-1.794
	-1.205
Manufacturing Firm	6.043***
	-0.835
City 250k to 1 million	1.308
	-1.01
City 50k to 250k	3.984***
	-1.287
Under 50k	0.559
	-1.385
Under 10k	3.288**
	-1.551
Observations	6,185
Notes:	

1. Standard errors in parentheses
2. *** p<0.01, ** p<0.05, * p<0.1
3. Effects are unconditional marginal effects
4. Reference categories are: medium sized firm, service firm, bonus 5 and city in capital or over 1 million pop.