

Institutional Voids, Economic Adversity, and Inter-firm Cooperation in an Emerging Market: The Mediating Role of Government R&D Support

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Abstract

This article examines the mediating mechanism of the relationship between institutional voids (IVs) and inter-firm cooperation and the moderating role of economic adversity in the context of small and medium-sized enterprises (SMEs) based in emerging markets. The hypotheses are tested using time-lagged survey data from 214 SMEs from Ghana. The findings provide support for the hypotheses by showing that (1) IVs positively influence the use of government research and development (R&D) support, (2) the use of government R&D support mediates the relationship between IVs and inter-firm cooperation, and (3) economic adversity positively moderates the relationship between IVs and the use of government R&D support. The findings contribute to understanding the role of IVs in inter-firm cooperation. Implications for theory and practice are discussed.

Key words: *inter-firm cooperation; SMEs; institutional voids; R&D support; Africa; Ghana*

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1. Introduction

The varying institutional environments across different markets exert a significant influence on firms' behaviour and their strategic choices (Doh et al., 2017; Townsend & Hart, 2008), including inter-firm cooperation and strategic alliances. However, the differences in the national supportiveness and quality of the institutional environment remain a source of uncertainty for firms (Tobias, Mair & Barbosa-Leiker, 2013). This is especially the case for firms based in less developed and unstable institutional environments, such as those in emerging economies (Bruton, Ketchen & Ireland, 2013). Emerging markets are characterised by bureaucracy, poor enforcement capacity of state officials, lack of reliable market information, poor intermediary institutions and unpredictable government actions (Doh et al., 2017; Hoskisson, Eden, Lau & Wright, 2000; Khanna & Palepu 1997; Khanna and Rivkin, 2001; Peng and Heath 1996). As such, emerging markets are characterised by a high degree of institutional voids (IVs), which occur when *“institutional arrangements that support markets are weak, or fail to accomplish the role expected of them”* (Mair & Marti, 2009, p. 422). Such voids influence firms' ability to exploit and explore market opportunities (Acquaah, 2007; Khanna & Palepu, 2000a, 2000b, 2010). For example, past research demonstrates that IVs, such as regulatory uncertainties and lack of market-supporting mechanisms, can manifest in curtailing firms' access to financial resources (Khanna & Palepu, 1999), limiting some firms' ability to cultivate ties for effective cooperation (Amankwah-Amoah & Debrah, 2017), which in turn hinders innovation and the development of competitive advantage (Castellacci, 2015).

Past studies have demonstrated that institutions directly shape firm behaviour (Ingram & Silverman, 2002; Marquis & Raynard, 2015; Meyer, Estrin, Bhaunik & Peng, 2009). Generally, firms operating in emerging markets develop a variety of compensating mechanisms such as inter-firm cooperation (Kundu, Munjal & Lahiri, 2020) to optimise resources, share risks and create new sources of competitive advantage, especially in situations that a single firm cannot tackle on its own. Ostensibly, when formal institutions are weak, firms tend to utilise substitute channels for

formal institutional support (Ge, Carney & Kellermanns, 2019; Khanna & Palepu, 2006). In particular, firms adopt network-based strategies, such as informal ties, alliances, consortia, cross-sector partnerships and relational governance mechanisms (Khanna & Palepu, 2000a; Mair, Martí & Ventresca, 2012), to facilitate economic exchanges (Peng & Luo, 2000). Firms based in emerging markets can overcome institutional challenges by forming inter-firm alliances and networks of relationships (Khan, Rao-Nicholson & Tarba, 2018).

The prevalence of institutional constraints across emerging and developing markets has forced organisations to forge and tighten relationships through different, cooperative ties as a means of leveraging resources and complementary capabilities to develop a competitive advantage (Khan et al., 2018). For example, the strategic-choice literature suggests that managerial decision-making takes account of the organisational environment (Child, 1972; McCarthy, Lawrence, Wixted & Gordon, 2010). Arguably, inter-firm cooperation is often such a strategic choice. However, the extant literature has not yet explored how IVs drive this decision-making and the underlying mediating and moderating factors leading to the formation of inter-firm cooperation. Thus, these issues remain underexplored (Gulati, 1998; Castañer & Oliveira, 2020). Inter-firm cooperation may be viewed as vital for emerging-market firms due to the presence of weak formal institutions (Ahuja & Yayavaram, 2011; Hiatt & Sine, 2014; Peng, Sun, Pinkham & Chen, 2009), as through such arrangements firms can have access to complementary resources and capabilities (Diestre & Rajagopalan, 2012; Gnyawali & Madhavan, 2001). Such access is extremely important for small and medium-sized enterprises (SMEs) in particular, since they are likely to lack a comprehensive internal resource base (Mesquita & Lazzarini, 2008).

Despite the progress made towards understanding the influence of IVs in driving firm behaviour and strategies, the extant literature exhibits some key research gaps. For instance, while efforts to explain the antecedents and consequences of IVs have blossomed, it remains unclear how IVs relate to inter-firm cooperation and the underlying mechanisms through which IVs may influence inter-firm cooperation. More importantly, our study is further motivated by the limited

studies focusing on how IVs drive SMEs, in particular those that are based in emerging markets, to engage in inter-firm cooperative engagements. Such inter-firm cooperation tends to be “*voluntary arrangements between firms involving exchange, sharing, or co-development of products, technologies, or services*” (Gulati, 1998, p. 293). Thus, the main purpose of this paper is to examine the effects of IVs on inter-firm cooperation and to clarify the boundary conditions of this potential association.

The present paper contributes to the broader international business and strategy literature in three important ways. First, it integrates ideas from the literature on inter-firm cooperation (Alter & Hage, 1993; De Faria, Lima & Santos, 2010; Gulati, 1998; Phillips, Lawrence & Hardy, 2000; Un, Cuervo-Cazurra & Asakawa, 2010) with the IVs’ perspective (Hoskisson et al., 2000; Khanna and Palepu 1997; Khanna & Palepu 1997, 2000a, 2000b; Peng and Heath 1996) in order to investigate the effect of IVs on inter-firm cooperation. In doing so, this paper extends Phillips, Lawrence and Hardy’s (2000) study by empirically testing the relationship between IVs and firms’ collaborative practices. Particularly, this paper focuses on the impact of IVs as an impelling force for inter-firm cooperation and highlights firms’ responses to institutional voids in emerging markets (cf. Doh et al., 2017).

Second, this paper explores the mediating mechanisms on the relationship between IVs and inter-firm cooperation. In this way, the paper shows how the use of government R&D support (participation of firms in government-funded R&D projects) mediates the hypothesised indirect link between IVs and inter-firm cooperation. Such a nuanced analysis is warranted because it sheds light on the ways in which unanticipated changes can be influenced and/or addressed by managers to achieve their firms’ strategic goals. Indeed, understanding the mechanisms through which macro-level variables such as IVs influence inter-firm cooperation is crucial to advancing the current literature in the fields of strategy and international management.

Third, the paper extends the inter-firm cooperation literature by offering a nuanced view on how IVs influence firms’ strategy in an emerging-economy context (Doh et al., 2017; Peng, Wang

and Jiang, 2008). Research on inter-firm cooperation in sub-Saharan Africa is currently limited and given the prevailing IVs in that region, the results from this study will be particularly important for developing and implementing strategies to support SMEs in mitigating IVs in sub-Saharan Africa. These firms are becoming important actors within the global value chains orchestrated by leading firms from developed markets.

2. Theoretical background and hypotheses development

2.1 Institution-based perspective

In the contemporary complex global environment, extending the focus of strategy research from industry conditions and organisational resources to encompass institutions is considered critical (Peng, 2002, 2017). Defined as “*the rules of the game in a society*”, institutions permeate all aspects of organisational life and exert different social and economic pressures on firms’ activities (North, p. 1990, p. 3), and frame decision-making. A central feature of the institution-based perspective (Peng, 2017; Peng et al., 2009) is the contention that “institutions matter” in the sense that they shape the strategic choices of organisational decision-makers and firms’ behaviour (Peng et al., 2009; Marquis & Raynard, 2015; Meyer et al., 2009). Informal institutional factors, such as ethics, cultures and norms, and formal institutional factors, including politics and laws, can curtail firms’ activities, thereby forcing some to develop and implement creative solutions in new markets (North, 1990, 1995; Peng, 2017). Thus, institutions provide the context for economic activities, stipulating the rules and guidelines related to economic exchanges (Blau, 1964). In the context of emerging markets, formal institutions are in a state of flux which makes inter-firm cooperation an effective strategy for developing competitive advantage and addressing IVs (Castañer & Oliveira, 2020; Gulati, 1998; Khanna & Palepu, 2010).

This paper utilises institutional theory (North, 1990, 1995; Scott, 1995) to establish how IVs influence inter-firm cooperation in emerging markets. Institutions affect the allocation of resources in a country (Baumol, 1990; Grossman & Kim, 1995) and directly affect the strategic

choices of firms (Marquis & Raynard, 2015; Meyer et al., 2009). Arguably, managers select between productive and unproductive forms of value creation based on their perceptions of the institutional environment in which they do business (Collins, McMullen & Reutzler, 2016). Assuming that firm resources are allocated to activities perceived to lead to the highest potential returns, IVs may promote or hinder productive behaviour such as innovation (Brixiova, 2013) and inter-firm cooperation (Khan et al., 2018). For example, where managers perceive voids, they may seek institutional support such as R&D funding to innovate.

2.2 *Resource dependency theory*

Resource dependency theory (RDT) suggests that external environmental factors influence the organisation's behaviour (Hillman, Withers & Collins, 2009; Pfeffer & Salancik, 2003). A key assumption of RDT is that reliance on "critical" and important resources influences firm behaviours and that organisational decisions and actions can be explained in terms of the particular dependency situation. That is, firms depend on other firms for the provision of important resources. It also explains why independent firms engage in different kinds of inter-firm cooperative arrangements such as alliances, joint-ventures, in-sourcing, mergers and acquisitions (Drees & Heugens, 2013; Haleblan et al., 2009).

In the context of emerging markets, challenges arising from IVs are addressed by developing compensating mechanisms to overcome market imperfections and failures. These may include inter-firm arrangements to help firms cope with the absence or underdevelopment of market-supporting institutions. Arguably, when formal institutions are weak or absent, firms tend to construct substitutes to provide formal institutional support (Peng et al., 2009). The need to compensate for these weaknesses in the business environment enables firms to develop collaborative approaches to facilitate economic exchanges (Boddewyn & Doh, 2011; Peng & Heath, 1996). In particular, firms in these environments are "*constrained and affected by their environment and act to attempt to manage these resource dependencies by setting up different*

forms of interorganisational arrangements” (Pfeffer & Salancik, 2003, p. 117). There are costs to these, since they are unlikely to be as efficient as an unfettered market operating in a perfectly defined environment, but they may offer a second-best solution (Rothaermel, 2001). Moreover, institutional voids can also trigger strategic responses such as developing and strengthening business group affiliates (Manikandan & Ramachandran, 2015), and foster international learning effort in emerging economies (Adomako et al., 2019), as well as non-market strategies (Cantwell et al., 2010; Mbalyohere & Lawton, 2018; Rao-Nicholson et al., 2019). In addition, the prevalence of IVs can force a firm to construct substitutes to compensate for the challenges in the business environment (Boddewyn & Doh, 2011; Peng et al., 2009). For example, firms cultivate network-based strategies, informal ties and relational governance mechanisms to facilitate economic exchanges (Peng & Heath, 1996). Firms operating in emerging markets can also respond to voids by acting alone or collaborating with local actors (Regnér & Edman, 2014) or altering their business models (Khanna & Palepu, 2010). These mechanisms tend to be institutionalised widely (Tsai, 2006) and can effectively function as informal substitutes for formal market-supporting institutions (Khanna & Palepu, 1997; Peng, 2003).

Based on the assumption that firms leverage opportunities and challenges in the non-market environment to their economic advantage (Baron, 1995), we assert that IVs could prompt firms to collaborate with other organisations in order to learn and develop a new set of capabilities. This is because firms may rely on these relationships to build and protect the value of their investments and develop competitive advantage. The foregoing reasoning is presented in our conceptual model in Figure 1. Next, we provide an explanation regarding the hypothesised relationships between the variables in the model.

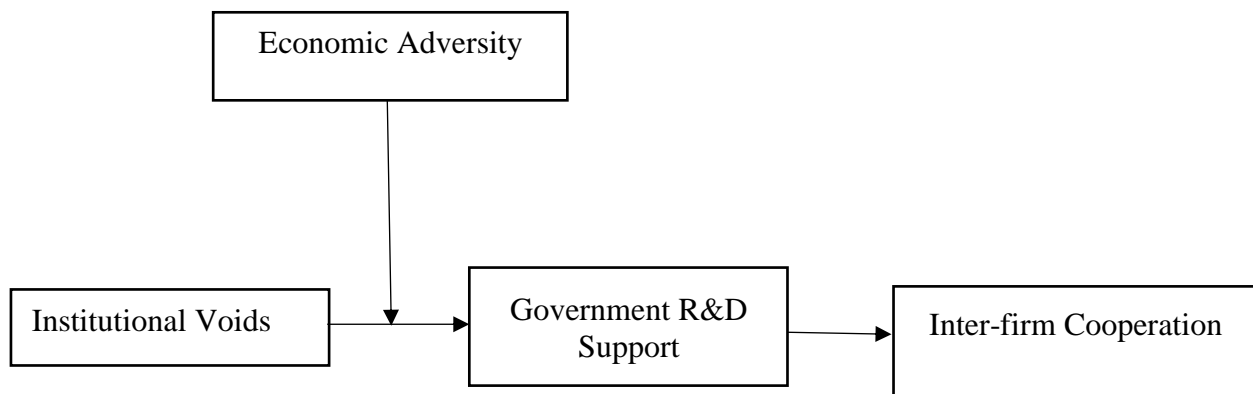


Figure 1: Research model

2.3 IVs and government R&D support

IVs are characterised by “weak institutions that facilitate economic activity, as well as the absence of an associated set of rewards and sanctions to enforce those rules, norms and belief systems” (Tracey & Phillips, 2011, p. 31). These institutional weaknesses pervade all aspects of firms’ activities in emerging markets (Julian & Ofori-Dankwa, 2013; Khanna & Palepu, 1999, 2006; Mair et al., 2012). Given the growing constraints emanating from IVs, such as lack of access to financial credit and weak market support for new business development (Khanna & Palepu 1997), firms tend to devise strategic responses in order to maintain or strengthen their market position (Amankwah-Amoah et al., 2019; Boddewyn & Doh, 2011). The lack of basic institutions underpinning the functioning of markets poses different challenges that warrant a host of effective strategic responses (Khanna & Rivkin, 2001; Marquis & Raynard, 2015). Thus, when IVs are intense, firms may use government support such as funding and grants for R&D and, constrained by a lack of internal resources, some firms may join forces with others to pool complementary resources to overcome such constraints (Boddewyn & Doh, 2011; Peng, 2002).

Institutional voids can also lead to additional compliance costs for organisations by adhering to rules and regulations relative to non-complying firms (Amankwah-Amoah et al., 2019). This disproportionate burden puts firms at a competitive disadvantage. In contexts characterised

by institutional voids, government agencies and departments are often typified by red tape and bureaucracy, which slow down the decision-making process (Amankwah-Amoah, Debrah & Nuertey, 2018). Besides these governments' inefficiencies, market-supporting intermediaries such as investors and venture capitalists tend to be non-existent (Chung & Luo, 2008; Khanna & Palepu, 2010), which imposes additional demand for the limited government resources and services. In addition, government resources are often not geared towards nurturing SMEs as sources of employment but rather focus on attracting multinationals (Debrah, 2007). Firms that are interested in gaining political legitimacy and obtaining political support are often enticed to join forces with governments and government entities to overcome these weaknesses (Lau & Busenitz, 2001).

Across the globe, governments have declared support for industry (Bai, Song, Jiao & Yang, 2019), R&D and innovation. Support for R&D can enable firms based in emerging markets to develop absorptive capacity (Cohen & Levinthal, 1990) and effectively respond to voids by forming inter-firm ties for the acquisition of knowledge, which in turn enables them to develop innovation (Khan et al., 2019). The approach to innovation and value-enhancing activities often differs, ranging from tax relief and subsidies to favourable loans to firms to buttress their operations (Bai et al., 2019; Kang & Park, 2012; Romijn & Albaladejo, 2002). Government R&D support entails offering financial support for firms to undertake R&D activities, which acts as an input to the innovation process. There is ample evidence that emerging-market firms have received government support to develop radical innovations, where formal banking channels are underdeveloped or do not provide adequate financial support to firms (Li & Atuahene-Gima, 2001). Ostensibly, challenges related to the failure of formal institutions require government intervention as they cannot be solved by market forces (Chaminade & Edquist, 2006). Thus, we argue that, as institutional arrangements that support markets become weaker, firms are more likely to use government assistance in the form of R&D support which acts as an imperfect substitute for strong institutions. Accordingly, we hypothesise:

***H1:** For firms operating in an emerging market, IVs positively relate to the use of*

government R&D support.

2.4 Government R&D support and inter-firm cooperation

In this study, we hypothesise that there is a relationship between the use of government R&D support and inter-firm cooperation. Inter-firm cooperation entails cultivating ties and value-creating relationships with other firms in value-chain activities such as IT systems and marketing with the objective of enhancing competitiveness (Rollins, Pekkarinen & Mehtälä, 2011). Simply put, inter-firm cooperation is “*a co-operative relationship among organisations that relies on neither market nor hierarchical mechanisms of control*” (Phillips et al., 2000, p. 23). IVs require the establishment of a trust-based relationship, therefore, inter-firm cooperation becomes more important in emerging markets. Cooperation occurs between firms such as buyers and their suppliers, and is an inter-firm phenomenon. Such inter-firm cooperation provides a means of accessing knowledge and complementary capabilities (Gulati, 1998; Diestre & Rajagopalan, 2012; Gnyawali & Madhavan, 2001). Given the benefits emanating from this cooperation, governments tend to support firms in the form of subsidies, tax incentives and loans to mitigate the detrimental effect of market environment factors. For example, in most emerging economies government funding programmes for R&D have become increasingly important to the development of firm-level innovation, which in turn enables local firms to nurture value-creating partnerships with global buyers. In advanced economies, governments promote inter-firm cooperation through grants, business organisations and universities. In the light of constraints and increasingly global competition, firms look to take advantage of government R&D support in order to overcome adversity (Rosenfeld, 1996). For example, regulatory uncertainties and the lack of market support mechanisms can curtail firms’ access to financial resources to commission R&D projects and develop radical innovation. Thus, governments encourage firms to access R&D project funds in order to address perceived market failures, mitigate institutional challenges and generate innovation (Feldman & Kelley, 2006).

Arguably, the use of government support by firms has been proven to stimulate inter-firm networks because firms use it to promote innovation (Kang & Park, 2012). For example, the provision of government subsidies for research has been shown to be a powerful public policy tool for inter-firm networks where knowledge spillover is greater (Spence, 1984; Trajtenberg, 2001). Consequently, empirical research shows a positive relationship between government support and industry collaboration (Hong, 2008; Kang & Park, 2012). Given the IVs that are prevalent in emerging markets, R&D support through government can become an effective underlying mechanism that may force firms to nurture a wide range of inter-firm cooperation to offset internal resource constraints and develop their competitive advantage. Thus, we propose that:

H2. *The use of government R&D support is positively related to inter-firm cooperation in an emerging market.*

H3. *The use of government R&D support mediates the relationship between IVs and inter-firm cooperation in an emerging market.*

2.5 The moderating effects of economic adversity

A key tenet of contingency theory is that firms' actions are influenced by external environmental forces (Ginsberg & Venkatraman, 1985; Venkatraman & Prescott, 1990). Given that the environment in which a firm operates plays a significant role in steering its strategy (Covin & Slevin 1991), we consider economic adversity as a potential moderating factor in affecting inter-firm cooperation in emerging markets. We focus on economic adversity because research shows that economic adversity is a key determinant of environmental uncertainty (Staw, Sandelands & Dutton, 1981). Adversity encapsulates "experiences that have the potential to produce undesirable outcomes by disrupting normal functioning" (Noltemeyer & Bush, 2013, p. 475). Indeed, perceptions of economic adversity reflect managerial appraisals of the degree to which a firm's operating environment promises losses (Staw et al., 1981). For example, a hostile economic environment (e.g. financial crisis) may suppress the availability of financial resources (Davidsson & Gordon, 2016).

Prospect theory and the threat-rigidity perspective (Chattopadhyay, Glick & Huber, 2001; Fiegenbaum & Thomas, 1988) offer two opposing views relating to the impact of economic adversity. According to prospect theory, when firms face impending losses due to economic adversity, they should take more risks (Kahneman & Tversky, 1979). This is because when economic adversity erodes the firm's strategic position, senior management should bolster investments in their innovative competencies to counter the adversity arising due to the turbulent and uncertain environments. The threat-rigidity hypothesis indicates the opposite (Staw et al., 1981). This perspective suggests that because adversity implies imminent losses, firms should be risk-averse and focus on protecting their position (Dutton & Jackson, 1987). In the face of looming losses, firms should reduce their investment in innovative ventures. Emerging markets suffer due to a greater level of economic adversity given their fragile institutions, thus formal planning becomes ineffective in dealing with uncertain conditions (e.g. Reymen et al., 2015). Thus, firms perceiving greater economic adversity and greater IVs are more likely to seek government R&D funding due to the uncertainty associated with gaining high returns from innovative activities. Thus, we propose:

H4: For firms operating in an emerging market, economic adversity positively moderates the relationship between IVs and the use of government R&D support.

3. Research method

3.1 Study setting: Ghana

Data from SMEs in Ghana were collected to test the proposed hypotheses of this study because SMEs account for 85–92% of all firms operating in that market (Adobor, 2020; Boadi et al., 2017). Moreover, SMEs are considered to be the engine for the country's economic development (Adobor, 2020; Amankwah-Amoah & Debrah, 2010). Despite the contributions of SMEs to Ghana's economy in terms of providing jobs and alleviating poverty, accounting for 70% of GDP, they face several constraints such as limited or lack of access to technical assistance and poor government support for capabilities development. For example, Ghana's business

environment is characterised by inadequate market-supporting institutions and weak enforcement capacity of regulatory and legal institutions (Acquaah, 2007; Saka-Helmhout, Chappin & Vermeulen, 2019). Thus, the survival of SMEs is threatened, forcing them to explore avenues to navigate around these constraints (Adobor, 2020; Asante, Kissi & Badu, 2018). These constraints create greater levels of uncertainty in the business environment and most SMEs tend to adopt compensating mechanisms to cope with highly turbulent conditions. Thus, inter-firm cooperation serves as a buffer to mitigate the uncertainty and turbulence arising from widespread IVs. Moreover, we consider this study to be timely and very important in the context of sub-Saharan Africa, as further research on SMEs in sub-Saharan Africa is needed to support the enactment of policies designed in support and for the development of SMEs (Mamman, Bawole, Agbebi & Alhassan, 2019). Indeed, SMEs depend more heavily on cooperation given internal resource constraints and so this is a more pertinent issue for them than for larger firms. Inter-firm cooperation can play an important role for SMEs operating in uncertain and turbulent environments to develop their absorptive capacity leading to the development of competitive advantage, and in turn mitigating the impact of IVs on their operations.

3.2 Sample and data collection

To test the hypotheses, a sampling frame of firms was derived from the Ghana Business Directory database (68,500 firms as of January 1, 2017). Data were collected in two waves with approximately eight months between the end of the first survey wave (T1) and the start of the second wave (T2). Due to the challenges of collecting data in an emerging country (Hoskisson et al., 2000), each wave took approximately three months. In the first wave, 1,150 firms were randomly sampled from the Ghana Business Directory. The sampled firms met the following criteria: (1) independent firms with no foreign affiliation and not part of any company group, (2) companies employing a minimum of five and a maximum of 250 full-time employees, (3) service providers or companies that manufacture physical products, (4) SMEs that had received

government-based R&D support between 2007 and 2017, and (5) SMEs with complete information for the Chief Executive Officer (CEO).

The questionnaire was sent to CEOs via email to obtain information on economic adversity, participation in government R&D support schemes, perceived IVs, and their strategic options to deal with the IVs. After sending three reminders, 333 responses were received from the founders/CEOs. After discounting missing values, a total of 300 complete responses were obtained, representing a response rate of 26.08%.

To mitigate the potential common method bias often associated with cross-sectional data (Podsakoff, MacKenzie, Lee & Podsakoff, 2003), senior managers of the 300 firms were also approached with a questionnaire in person to capture measures of inter-firm cooperation (T2). Accordingly, the questionnaire was sent to executives with a general manager or senior management function, since the database contained addresses of the firms' senior management teams. After several visits to the head offices of the firms, 267 responses were obtained. Several firms were excluded due to missing or inconsistent data resulting in 53 responses being excluded. Thus, 214 complete, matched responses from T1 and T2 were used for this study, representing an effective response rate of 18.60% (i.e. $[214/1150] \times 100$).

The informant competency of each respondent was captured using the procedure suggested by Morgan, Kaleka and Katsikeas (2004). Accordingly, the respondents were asked to indicate (1) their level of knowledge relating to the questions asked; (2) the accuracy of the information provided; and (3) their confidence in providing answers to the questions. This information was obtained on a seven-point Likert scale (1 = strongly disagree; 7 = strongly agree). A mean score of 6.52 (SD = .57) was obtained for respondents' level of knowledge, 6.45 (SD = .53) for accuracy of responses and 6.62 (SD = .55) for respondents' confidence in answering the questions. This suggests that the respondents were competent in providing answers to the questions.

The final sample contained SMEs with a mean age of 27.75 years (SD= 16.15) and a mean size of 82.47 full-time employees (SD= 13.17). The firms had an average annual turnover of U.S.\$

652,590 and were operating in the following industries: textile manufacturing (16.9%), healthcare equipment manufacturing (13.2%), financial services (35.9%), consulting and advisory (19%) and retailing (15%). Thus, 30.1% of companies were manufacturers of physical products whilst 69.9% were service providers. The respondents in the final sample included executives with functions such as general manager (38.9%), deputy managing director (33.6%) and other senior management (27.5%). Most of the executives held a higher education degree: bachelor's (48.5%), master's (39.4%) and high school certificate (12.1%). The average age of the CEO was 42 years and the average tenure in the organisation was nine years with 14 years average industry experience.

Differences between respondents and non-respondents were explored by using the same sampling frame (Ghana Company Directory) and comparing across a range of characteristics including respondents' age and industry affiliation of the firms. A chi-square test (Greenwood & Nikulin, 1996) indicated no significant differences between respondents and non-respondents with respect to respondents' age and industry. Thus, non-response bias is not considered to undermine the findings presented below (Armstrong & Overton, 1977; Rogelberg & Stanton, 2007).

3.3 Measures

In line with the extant literature, a 7-point multi-item measure was used to capture all the constructs. The items that were used to measure the constructs are shown in Appendix 1.

IVs. In this study, IVs are defined as situations where a business environment lacks reliable market information, efficient intermediary institutions, predictable government actions and an efficient bureaucracy (Khanna & Palepu 1997, 2000a, 2000b). Accordingly, we used seven items from Giachetti (2016) to measure this construct which were adapted to reflect the Ghanaian context. That is, instead of "Chinese business environment", the "Ghanaian business environment" was used.

Economic adversity. Economic adversity was measured by adopting Voss, Sirdeshmukh and Voss's (2008) three-item scale. Respondents were asked to register their assessment of current economic conditions in the operating business environment.

The use of government R&D support. A firm's participation in government funding was measured using government grants as a proxy for government investment (Kang & Park, 2012). The same approach was adopted to assess governmental R&D support as follows: 1 = the firm received government grants for its projects in a particular year and 0 = otherwise.

Inter-firm cooperation. Inter-firm cooperation was captured as the extent to which the firm placed importance on other firms in various stages of its innovation process (Alexiev, Volberda & Van den Bosch, 2016; West & Bogers, 2014). Accordingly, a six-item scale was used from Alexiev et al. (2016) to capture the degree of inter-firm cooperation. These items assessed the role of external parties at different stages of a firm's innovation value chain (e.g. product or service development, production, marketing, distribution and supply chain).

Control variables. Firm size, firm age, industry, CEO education, CEO age, CEO tenure and knowledge search were also included to act as control variables. Firm size was captured as the log transformation of the number of full-time employees. Firm age was a log transformation of the number of years since the firm was incorporated. Industry was measured with a dummy variable with "1" indicating manufacturing industry and "0" indicating service (Wang, 2008). CEO's education was coded as 1 = "high school", 2 = "higher national diploma", 3 = "bachelor's degree", 4 = "master's degree" or 5 = "doctoral degree". CEO's age was calculated as the number of years since the CEO was born. CEO tenure was captured by using the years in which the CEO had been employed in his/her current position (Boling, Pieper & Covin, 2016). Finally, knowledge search is controlled for because it has been shown to be relevant in this context (Alexiev et al., 2016), captured with the inclusion two additional items (Appendix 1).

4. Analyses

4.1 Common method bias, validity and reliability assessment

To mitigate potential common method variance influencing the findings of the study, information on the independent and dependent variables was obtained from multiple sources, which effectively minimises concerns raised by common method variance (CMV). However, several further statistical tests were performed. First, the approach by Podsakoff et al. (2003) was adopted and two models were estimated. This test showed that the path coefficients of the main model did not change when the model without common method factor ($\chi^2/df = 2.32$, CFI = .95, RMSEA = .03, TLI = .98) was integrated and compared with the model with common method factor ($\chi^2/df = 2.29$, CFI = .94, RMSEA = .04, TLI = .97). Second, the marker variable approach advanced by Lindell and Whitney (2001) was adopted with the use of a variable which captured whether “personnel behave autonomously in our business operations” – a measure of autonomy, acting as a marker variable. This variable is suitable because, theoretically, it is unrelated to any of the main constructs. In this study, autonomy had a nonsignificant correlation ranging from -.01 to .04. Third, the approach recommended by Cote and Buckley (1987) was applied, with the estimation of three competing models: Model 1 was a method-only model in which all indicators were loaded on a single latent factor; Model 2 involved a trait-only model where each indicator was allowed to load on its respective latent factor; and Model 3 was a method-trait model in which a common factor that links all the indicators in Model 2 was estimated. A comparison of the three models showed that Model 2 and Model 3 were materially better than Model 1. However, Model 3 was not differentially better than Model 2. Overall, the assessment showed that CMV did not substantially influence the study’s findings.

Using the LISREL 8.71 software, a confirmatory factor analysis (CFA) was conducted on all scales to check for potential problematic indicators among the study’s constructs. Item loadings were as hypothesised and were positive and significant, confirming convergent validity, obtaining indices that exceed the suggested cut-off criteria of .70, .60 and .50 respectively (Bagozzi & Yi,

2012), and each factor loading exceeded the minimum threshold value of .40 ($p < .001$). This affirmed convergent validity of the measures. To assess discriminant validity, the average variances extracted (AVE) were compared with the shared variances between constructs (Appendix I). Each construct's AVE was greater than the highest shared variance, confirming discriminant validity (Fornell & Larcker, 1981).

Table 1. Means, standard deviations and correlations

| | Variable | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 |
|-----|------------------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|------|
| 1. | Firm size ^α | | | | | | | | | | | |
| 2. | Firm age ^α | .09 | | | | | | | | | | |
| 3. | Industry | .04 | .10 | | | | | | | | | |
| 4. | CEO age (years) | -.03 | .11 | -.02 | | | | | | | | |
| 5. | Education | .14 | .00 | -.05 | .09 | | | | | | | |
| 6. | CEO tenure | .08 | .10 | .07 | .12 | .05 | | | | | | |
| 7. | Knowledge search | .11 | -.09 | .34** | .10 | .26** | .33** | | | | | |
| 8. | Institutional voids | -.11 | -.01 | .03 | -.03 | .19** | .09 | .13* | | | | |
| 9. | Economic adversity | -.01 | -.13* | -.04 | -.10 | -.13 | .19** | -.02 | .21** | | | |
| 10. | Government R&D support | -.06 | -.08 | .11 | .02 | .08 | .12 | .10 | .33** | .23** | | |
| 11. | Inter-firm cooperation | .18** | -.09 | .08 | .22** | .29** | .28** | .22** | .35** | .14* | .27** | |
| | Mean | 5.31 | 3.56 | .59 | 41.70 | 2.96 | 8.75 | 4.03 | 3.56 | 3.70 | .67 | 4.04 |
| | Standard deviation | .99 | .79 | .49 | 9.20 | 1.20 | 6.93 | .65 | .61 | .50 | .48 | .43 |

^α Log transformed

* $p < .05$; ** $p < .01$

4.2 Analytical procedure and results

Table 1 contains descriptive statistics and correlations. Due to potential multicollinearity associated with interaction terms, all variables included in the interaction were mean-centred and used in the regression model. To investigate potential multicollinearity influencing the results of the study, each variance inflation factor (VIF) was calculated and inspected. The largest VIF was 3.09, which is below the suggested threshold value of 10 (Aiken, West & Reno, 1991). This suggests that multicollinearity did not influence the results of the study. The results of the normality test suggest no significant violations. Thus, the data were found to be suitable for regression analysis. Hierarchical regression analysis was used to test the specified hypotheses.

Results are presented in Table 2. The dependent variable in Models 1–4 is the use of government R&D support. Model 1 adds the control variables. Model 2 includes IVs and shows a significant effect on the use of government R&D support ($\beta = .29, p < .01$), thus H1 is supported. The inclusion of the moderator (economic adversity) in Model 3 shows that the influence of IVs on the use of government R&D support is still significant ($\beta = .27, p < .01$). Model 4 includes the interaction terms between IVs and economic adversity. The interaction term is positive and significant ($\beta = .42, p < .01$), indicating that economic adversity positively moderates the effect of IVs and the use of government R&D support. Thus, H4 also receives support.

In Models 5–8, the dependent variable is inter-firm cooperation. The results allow for the testing of the mediating role of the use of government R&D support. In testing the mediating hypothesis, the approach used by An, Zhao, Cao, Zhang and Liu (2018) and Zhao, Lynch and Chen (2010) was followed. First, the independent variable and the mediator should be significantly related and Model 2 shows that IVs (independent variables) are positively related to the use of government R&D support ($\beta = .29, p < .01$). Second, the mediating variable should be related to the dependent variable and Model 7 demonstrates that the use of government R&D support is positively related to inter-firm cooperation ($\beta = .37, p < .01$). Thus, H2 receives support. Third, the effect of the independent variable on the dependent variable should be non-significant or attenuated when the

mediating variable is included in the regression equation. In Model 8, when both IVs and the use of government R&D support are included, the use of government R&D support has a positive influence on inter-firm cooperation ($\beta = .39, p < .01$). In addition, the effect of IVs on the use of government R&D support becomes non-significant ($\beta = .03, ns$). This result shows that the use of government R&D support mediates the relationship between IVs and inter-firm cooperation. Thus, H3 receives support.

Further evidence of full mediation is obtained from the Sobel test (Sobel, 1982) which calculates the degree of the unstandardized indirect effect and the standard error associated with it. We compare this statistic with the z distribution to establish the statistical significance of the indirect effect. Results show that the indirect effect of IVs on inter-firm cooperation ($z = 1.82, p < .05$) was statistically significant as hypothesised.

To gain further insight into the indirect effect, the procedure suggested by Hayes (2013) – the PROCESS analysis – was applied. Table 3 demonstrates the conditional indirect effects of the use of government R&D support at different values of economic adversity. The results in Table 3 show that the mediating effect is significant at all values of economic adversity. That is, at high levels of economic adversity, the bootstrapped confidence interval around the indirect effect does not include zero (95% CI [.12, .32]). In addition, at low levels of economic adversity, the bootstrapped confidence interval around the indirect effect again does not include zero (95% CI [.02, .26]). Thus, H3 is supported, which predicted that the use of government R&D support mediates the relationship between institutional support and inter-firm cooperation.

Table 2. Regression results

| <i>Control variables</i> | Models 1–4: Government R&D support | | | | Models 5–8: Inter-firm cooperation | | | |
|------------------------------------|---|---------|---------|---------|---|---------|---------|---------|
| | Model 1 | Model 2 | Model 3 | Model 4 | Model 5 | Model 6 | Model 7 | Model 8 |
| Firm size (employees) ^α | -.12* | -.11* | -.12* | .14** | .13** | -.10* | -.11* | -.11* |
| Firm age ^α | -.09* | -.10* | -.12* | -.10* | -.10* | .14** | .12* | .11* |
| Industry | .08 | .05 | .06 | .08* | .06 | .04 | .05 | .05 |
| CEO age | .05 | .04 | .05 | .16*** | .14** | .14** | .12* | .12* |
| Education | .07 | .08* | .09* | .10* | .09* | .09* | .11* | .12* |
| CEO tenure | .09* | .10* | .11* | .12* | .13** | .14** | .15*** | .16*** |
| Knowledge search | .16*** | .17*** | .19*** | .20*** | .22*** | .25*** | .26*** | .28*** |
| <i>Independent variable</i> | | | | | | | | |
| Institutional voids (IV) | | .29*** | .27*** | .26*** | | .16*** | | .03 |
| <i>Moderator</i> | | | | | | | | |
| Economic adversity (EA) | | | .33*** | .34*** | .25*** | .28*** | .38*** | .39*** |
| <i>Interaction</i> | | | | | | | | |
| IV * EA | | | | .42*** | | | | |
| <i>Mediator</i> | | | | | | | | |
| Government R&D Support | | | | | | | .37*** | .37*** |
| <i>Model fit statistics</i> | | | | | | | | |
| F | 1.59 | 3.81*** | 6.20*** | 7.09*** | 2.32** | 3.61*** | 5.80*** | 6.38*** |
| R2 | .12 | .20 | .27 | .33 | .13 | .19 | .26 | .31 |
| ΔR2 | - | .08 | .07 | .06 | - | .06 | .07 | .05 |
| Largest VIF | 1.20 | 3.09 | 1.46 | 1.77 | 2.76 | 2.11 | 1.59 | 2.61 |

N = 214; * p < .10.; ** p < .05; *** p < .01; standardised coefficients are shown. ^α Logarithm transformation of original values.

Table 3. Test of conditional indirect effects at values of economic adversity (moderator)

| Mediating variable | Value of economic adversity | Effect | Boost SE | 95% confidence interval | |
|------------------------|-----------------------------|--------|----------|-------------------------|-------|
| | | | | Lower | Upper |
| Government R&D support | 3.21 | .17 | .07 | .02 | .26 |
| Government R&D support | 3.89 | .18 | .05 | .08 | .27 |
| Government R&D support | 4.28 | .26 | .05 | .12 | .32 |

Results are based on 1,000 bootstrap sample

4.3 Supplementary analysis

To provide additional insights regarding the results reported in this article, supplementary analysis was undertaken to substantiate the robustness of the modelling presented above. First, an alternative measure of inter-firm cooperation as our dependent variable was used, specifically the total number of partnerships *with domestic firms*. The results confirmed the findings reported above for all the hypotheses relating to inter-firm cooperation as a dependent variable. Second, an alternative model including additional control variables including gender, environmental dynamism, prior performance and R&D investments as percentage of revenue were estimated. Industry influence was also explored by splitting the sample into two types of firms: manufacturing and service firms. The results were in line with the initial findings and indicate that the findings presented in this paper are robust with respect to alternative explanations (Stam, 2010).

Finally, it is recognised that government R&D support and inter-firm cooperation are likely to be endogenous as firms may seek government R&D support based on their ability to collaborate, and firms that engage in inter-firm cooperation are likely to be better at accessing and using government R&D support. To address concerns of possible endogeneity (Zaefarian, Kadile, Henneberg & Leischnig, 2017) a two-stage least square (2SLS) estimation strategy was followed (Hamilton, Nickerson & Owan, 2003; Poppo Zhou & Li, 2016). Stage 1 regressed *the use of government R&D* against its predictor (IVs) to obtain predicted residual for the mediator (use of government R&D), and in stage 2 these residuals were included as the independent variable relative to inter-firm collaboration. The effect of *use of government R&D residual* on inter-firm collaboration is not significantly different from our initial results (Table 2). Thus, potential endogeneity between use of government R&D and inter-firm collaboration is ruled out (Hamilton et al., 2003). In addition, the measurement of the independent variable and the dependent variable was undertaken eight months apart (time-lagged). This process isolates the analysis from the potential reverse causality between independent and dependent variables, and

deals with omitted variable bias (Antonakis, Bendahan, Jacquart & Lalive, 2010; Deesomsak, Paudyal & Pescetto, 2004).

5. Discussion and conclusion

Inter-firm cooperation has increasingly become an effective strategic choice for overcoming constraints and challenges, especially in emerging economies (Khanna & Palepu, 2010; Khanna & Rivkin, 2001). Such studies examining how firms respond to institutional voids are rare in the context of emerging markets (cf. Doh et al., 2017). Thus, this paper seeks to examine the use of R&D support as an important intervening mechanism between managers' perception of IVs and inter-firm cooperation in emerging markets. In addition, the paper investigates the impact that economic adversity may have on the IVs–R&D support relationship and the formation of inter-firm cooperation. Utilising time-lagged data from 214 SMEs in Ghana, the results show that IVs positively relate to the use of government R&D support and that this relationship is amplified when economic adversity is greater. Furthermore, the results show that the use of government R&D support mediates the relationship between IVs and inter-firm cooperation. From the institution-based perspective, the finding relating to the positive relationship between the level of IVs and inter-firm cooperation via the use of government R&D support, suggests that the weak market-supporting mechanisms such as lack of financial credit availability, bureaucratic procedures, weak protection of intellectual property and weak legal enforcement mechanisms actually served as a trigger for firms to forge interorganisational partnerships. However, the finding that the use of government R&D mediates the relationship between IVs and interfirm cooperation suggests that the presence of IVs in emerging markets actually allows firms to seek government support which eventually helps them to form collaborations such as alliances, consortia and cross-sector partnerships to help them optimise resources, share risks and create new sources of competitive advantage (Barringer & Harrison, 2000; Selsky & Parker, 2005). Moreover, the R&D support received from government agencies

enables them to fill the perceived “*legitimacy vacuum*” that often curtails their operations and growth in emerging markets. In addition, it also enables them to gain access to knowledge, market information and technical supports as a means of overcoming the constraints in such institutional-voids’ settings.

The findings highlight several theoretical and practical implications. First, in a departure from previous studies examining the antecedents of inter-firm cooperation (Hardy et al., 2003; Kundu et al., 2020; St-Pierre, Sakka & Bahri, 2018; Zaheer, McEvily & Perrone, 1998), this paper provides novel insights on the association between IVs and the decision to enter into inter-firm relationships in an emerging-market context. Particularly, the results show that the level of IVs in a firm’s operating environment indirectly influences the extent to which a firm collaborates with other firms and partners. While previous studies have modelled the consequences of inter-firm cooperation such as innovation (Alexiev et al., 2016; Kang & Park, 2012), our paper sheds important light on the processes and antecedents of inter-firm cooperation in the context of SMEs originating from emerging markets, given the limited research on examining the processes of SMEs’ inter-firm cooperation in the emerging-market context. This is an important contribution because as yet the underlying mechanisms through which IVs influence inter-firm cooperation in emerging markets are not well known. Indeed, establishing these is valuable in the field of strategy given that extant scholarship suggests that institutions directly influence firm-level strategic actions (Cantwell et al., 2010; Marquis & Rarnard, 2015; Meyer et al., 2009).

Second, the findings support the hypothesis that the effect of IVs and the use of government R&D support is more positive when economic adversity is greater. This finding supports the view that government support stimulates inter-firm networks (Kang & Park, 2012). With this finding, the paper links the institutional-based view with contingency theory of the firm by going beyond the assumption that greater IVs automatically alter a firm’s strategy (Adomako et al., 2019; Ge et al., 2019). This paper shows that firms that perceive greater IVs

are better positioned to use government R&D support when they operate in increasingly economically adverse environments, which in turn influences the process of inter-firm cooperation to mitigate the impact of highly uncertain and turbulent environments such as those observed in emerging markets.

Third, empirical examinations of the antecedents of inter-firm cooperation are mostly biased to studies from developed country contexts, indicating that the factors driving inter-firm cooperation in emerging countries are less understood. The institutional difference hypothesis (Julian & Ofori-Dankwa, 2013) suggests that different cultural, institutional, economic and socio-political contexts (Hoskisson et al., 2000) affect firms' strategies in emerging economies differently. Thus, while advanced country contexts are characterised by strong institutional support, those in emerging countries exhibit weak intellectual property rights, a lack of transparency, high levels of red tape, bureaucracy, administrative delays, inadequate disclosure regimes, corruption and political instability (Khanna & Palepu, 2000a, 2000b, 2010). All of these may negatively affect the competitive advantage of firms. Accordingly, this paper draws on the contextual influence of emerging economies to model inter-firm cooperation as a consequence of IVs. It adds to the emerging-country perspective of inter-firm cooperation as it emphasises the importance of IVs when modelling complex strategic decisions such as inter-firm cooperation (Ahuja & Yayavaram, 2011; Doh et al., 2017; Marquis & Raynard, 2015).

Apart from the theoretical contributions outlined above, this paper offers two practical contributions. First, given that IVs influence inter-firm cooperation via government R&D support, managers in emerging countries can utilise the insights from this study to boost their inter-firm partnerships. Firms from emerging markets are becoming important players within global value chains, and so managers need to nurture a wide range of value-creating relationships with a diverse set of stakeholders in order to develop competitive advantage within their value chains. In an era in which operating in emerging markets has become a necessity for many firms, understanding how IVs enhance inter-firm cooperation enhances our

understanding of firms' strategy in emerging economies (cf. Doh et al., 2017). Thus, this finding could help managers to foster different cooperation between local and foreign firms to promote knowledge transfer and industry best practice, and develop different types of innovation. Second, findings from the current study indicate that, for emerging-country SMEs, the fact that the effects of IVs on the use of R&D support is greater when economic adversity is greater, might encourage them to collaborate with other firms that are present in their given industry and beyond, in order to cope with uncertain and turbulent conditions. While prior research shows that IVs constitute an institutional vacuum for firms in emerging economies (Khanna & Palepu, 1997, 2000a, 2000b), this paper shows that this vacuum helps firms to take advantage of R&D support from the government to collaborate with other firms.

6. Limitations and future research

Although the research design allowed for the collection of data from multiple informants and at different points in time, helping to alleviate problems found in same-source data (Podsakoff et al., 2003), this study has several limitations. First, the variables were not manipulated nor were random assignment methods used, both of which could boost our confidence in making causal claims. Here, the cross-sectional nature of the research design does not allow for the drawing of causal claims. We therefore encourage future researchers to use a longitudinal mixed methods research design to further examine dynamic changes between IVs, the use of government R&D support, and inter-firm cooperation across different emerging and developing markets. In addition, future research should use random assignment techniques as well as experimental design to help make strong causal claims.

Second, although a time-lagged dataset from Ghana was used, the findings presented here may not apply to the unique contexts of other emerging-economies' SMEs given the wide variations across this population. Despite the significant progress in political and institutional reforms in emerging countries during the last decade, several sub-Saharan economies still lag

in democratic institutional reforms (Bruton, Ketchen & Ireland, 2013). Moreover, in view of the marked structural differences between developed and emerging economies (Gammeltoft, Barnard & Madhok, 2010), a larger and more varied sample from both developed and emerging nations would allow for a more detailed comparative analysis.

Third, the subjective measure of inter-firm cooperation has the potential to introduce respondent bias into the sample. While the inter-firm cooperation measure used in the current study has been validated in the literature (Alexiev et al., 2016), future studies may want to make use of secondary sources of inter-firm collaboration information and potentially examine how inter-firm cooperation evolves over time. Such studies could use longitudinal research design and multiple case studies to investigate how the process of inter-firm cooperation unfolds across different stages of the relationship. Fourth, there is scope for future research to examine the dynamic process of inter-firm cooperation and co-opetition (Audretsch & Belitski, 2019; Cozzolino & Rothaermel, 2018; Ritala, 2012), and their outcomes across value chains. Thus, future studies could examine the dissolution of inter-firm cooperation and its consequences on emerging-market-firm survival. Fifth, it would be interesting to explore the type and quality of inter-firm cooperation and its impact on incremental and radical innovations. Sixth, there is a potential dark side to inter-firm cooperation and alliances (Abosag, Yen & Barnes 2016; Oliveira & Lumineau, 2019), therefore future studies need to examine how SMEs balance these relationships and optimise value through such alliances. Lastly, although a dummy variable was used here to capture the use of government R&D support, the use of a dichotomous variable to capture such behavioural phenomena limits the rigorousness of the findings. Future studies should look to use a more robust measure of government R&D support.

Despite these limitations, the results reported in this research show that high levels of IVs indirectly but positively drive inter-firm cooperation, and that this linkage is positively moderated by economic adversity. Overall, this study contributes to theory development by

providing a clearer illustration of the specific conditions in which IVs impact on the use of government R&D support within an emerging-country context, which in turn influences the process of inter-firm cooperation.

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Appendix 1: Measures, validity and reliability assessment

| Details of measures | Loadings (t-values) |
|---|------------------------|
| <i>Economic adversity:</i> CR = .89; AVE = .64; HSV = .12 | |
| The venture's economic environment is promising (r) | .90 (1.00) |
| The current overall business environment is an opportunity (r) | .94(24.87) |
| The current operating environment is particularly hostile | .85(19.82) |
| <i>Institutional Voids:</i> CR = .83; AVE = .59; HSV = .13 | |
| The Ghanaian business environment lacks infrastructure to facilitate the relationship between firms and their clients, or between firms and their suppliers | .77 (1.00) |
| We were able to find adequate and reliable information about the tastes and preferences of consumers, and the reliability of suppliers with ease (r) | .78(12.68) |
| The Ghanaian business environment is characterised by underdeveloped education infrastructure | .92(15.37) |
| The Ghanaian business environment is characterised by complicated bureaucratic procedures to acquire licenses and certificates | .84(13.42) |
| The Ghanaian business environment is characterised by ambiguous bureaucratic and legal system in the field of contractual agreements, protection of copyright | .80(12.98) |
| The Ghanaian business environment is characterised by difficulties for firms to access to financial resources and loans | .90(14.76) |
| In Ghana, payment systems are underdeveloped making it difficult to complete financial transactions | .79(12.72) |
| <i>Knowledge search:</i> CR = .85; AVE = .62; HSV = .09 | |
| Knowledge is gathered by our firm in various ways | .92(1.00) |
| Our firm collects information through informal channels | .84(14.49) |
| <i>Inter-firm cooperation:</i> CR = .88; AVE = .62; HSV = .09 | |
| In the past three years, to what extent has your organisation ... | |
| ...worked together with other organisations for product and/or service innovations. | .77 (1.00) |
| ...worked together with other organisations in order to put new products and services to market | .94(20.34) |
| ...allied with other organisations in order to introduce new products and/or services | .80(12.44) |
| ...implemented joint promotional activities for new products and/or services | .89(15.71) |
| ...maintained joint distribution and service agreements for new products and services. | .84(13.19) |
| ...signed contracts with other companies and institutions for product development | .87(14.09) |

Note: r=reverse coded