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Entrepreneurship orientation and business discontinuance: A relationship analysis of total early-stage activities in the BRICS countries

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ABSTRACT

Purpose of the study: The links between entrepreneurial orientation (EO) and business discontinuance are seldom researched. This article analyses EO and business discontinuance rates in the countries of Brazil, Russia, India, China and South Africa (SA) of which the acronym is BRICS. The study aim is to establish whether innovative management of SMEs increase business survival rates. The BRICS formed in 2009-2010 but research comparing their SME sectors are sparse. Theoretically, EO underscored by innovation, high export-intensity and new technology take-up within early-stage entrepreneurship should lower business discontinuance.

Design/methodology/approach: Data for the variables studied were extracted from the Global Entrepreneurship Monitor (GEM) report and the study hypothesised that innovation, high export-intensity and new technology take-up rates are negatively correlated with business discontinuance rates. The hypotheses were tested using correlation analysis. Kruskal-Wallis and post hoc tests find significant overall variances and specific country-country variances.

Findings: While overall total early-stage entrepreneurship (TEA) is positively correlated with business discontinuance, the TEA variables scrutinised in the study are indeed mostly negatively correlated. These findings indicate that more generic small businesses are not good for accelerated economic growth because specific qualities in SMEs increase their survival and growth. Furthermore, innovation and new technology take-up are consistently positively correlated, implying that innovation cannot do without new technology.

Recommendations/value: EO within SME management practice must be nurtured by well-crafted entrepreneurial policy and implementation. Support to SMEs, in particular with technology and digitalisation, is required to boost their innovation and competitiveness. Policy support is required to boost SMEs enter global value chains.

Managerial implications: Entrepreneurs and SME managers must increase their EO and focus on being innovative, export-driven and to employ new technology. SMEs need these inputs to grow and survive. SME management must also find ways to invest in new technology in order to increase their innovation and competitiveness.

Key phrases

BRICS; business discontinuance; entrepreneurial orientation; TEA; TEA-high export-intensity; TEA-innovation and TEA-new technology take-up.

1. INTRODUCTION

Viewing entrepreneurs as all the same is inconsistent with recent literature. 'Impactful entrepreneurs' differ from generic entrepreneurs. The former is innovative, growth-oriented, global and technology savvy, while the latter are generally low growth without innovation or new technology usage (Bosma & Kelley, 2019). The term impactful entrepreneurs links to the entrepreneurial orientation literature, where entrepreneurs pursue business growth through risk-taking, proactiveness and innovation (Wales, 2016). Furthermore, EO is a strategic orientation that affects entrepreneurship activity towards innovation and business growth (Zehir *et al.,* 2015). This link between impactful entrepreneurship and EO is an approach, to SME management, that the current research proposes to lower business discontinuance. Therefore, the current research article considers how well new, small businesses perform in terms of innovation, new technology take-up and high export-intensity as indicators of EO.

Entrepreneurship is widely acknowledged to contribute to economic output (Urbano & Aparicio, 2016), although there is increasing recognition of the different levels of the economic contribution that will depend on the type of entrepreneur (Bosma & Kelley, 2019). Entrepreneurship is generally defined through deliberate and planned business startup and growth behaviour (Nieman & Nieuwenhuizen, 2014). This involves opportunity recognition and exploitation with innovation as a key requirement that distinguishes impactful entrepreneurs from generic entrepreneurs. Love and Roper (2015) and Brundin and Vigren-Kristoferson (2013), define new products and services as essential to business innovation. Furthermore, opportunity-driven entrepreneurs contrast to necessity-driven entrepreneurs who result from desperation such as unemployment but are without growth prospects (Ács *et al.,* 2018). Innovative opportunity-driven entrepreneurship correlate more positively with economic growth and Gross Domestic Product (GDP) in Organisation for Economic Co-operation and Development (OECD) countries than in non-OECD countries (Urbano & Aparicio, 2016).

It is not surprising then that entrepreneurship in innovation-driven economies has the lowest business discontinuance rates (Singer *et al.,* 2018). Innovation-driven economies are

knowledge-intensive, high-income with higher levels of human capital - associated with increased economic activity and earnings (Daru, 2015) - and have larger service sectors than any other (Bosma & Kelley, 2019). Conversely, factor- and efficiency-driven economies are intensely extractive, in industries such as mining and agriculture for the former, or manufacturing for the latter, and are low- to middle-income, respectively. Innovation-driven economies have 20 percent more new businesses survive into the established-business phase (42 months) compared to factor- and efficiency-driven economies (Herrington & Kew, 2017). Therefore, in factor- and efficiency-driven economies, two (2) more businesses in every ten will discontinue before the three-and-half year mark, compared to innovation-driven economies.

1.1. Business discontinuance

Business discontinuation is defined as business closure and ceasing all business operations (Pretorius, 2009). However, it should not be confused with the selling of a business or merely changing ownership (and the business continues to operate). The Global Entrepreneurship Monitor (GEM) defines the term business discontinuance rate as entrepreneurs who in the prior 12 months have closed their business. The GEM methodology further defines an established business as one past the 42-month stage (Bosma & Kelley, 2019). Small- to medium-sized enterprises (SMEs) business discontinuance, when compared to that of large businesses, is a serious problem worldwide - despite the enormous proportion of SMEs: 99 percent in the United states of America (USA), 96 percent in Australia (Escrivão Filho *et al.,* 2017) and 95 percent in OECD countries (Karadag, 2015) of all businesses are SMEs. Regardless of the impressive statistics, more than 50 percent of SMEs close within three (3) years of opening (Artinger & Powell, 2016), and the main cause thereof is consistently reported as low profitability (Singer *et al.,* 2018). But poor profitability has underlying causes such as asset turnover ratios, net sales to current-asset ratios, business growth and international sales or deficit thereof - and is, therefore, not a reason in itself (Isik & Tasgin, 2017). The causes of business discontinuance can be internal or external to the business (Arasti, 2011a). Well-cited causes of business discontinuance include bad management (De Jager, 2017), inadequate capital supply (Bosma & Kelley, 2019), poor finance and need of market access (Franco & Haase, 2010) and factors associated with gender such as human capital and physical resources have been studied (Arasti, 2011b). In view of the low rates of translation of business start-up to established business, the GEM global reports increasingly distinguish between impactful entrepreneurship and entrepreneurship of all kinds (Bosma & Kelley, 2019). Therefore, to prosper, nations must distinguish the type of entrepreneurship contributing to economic growth and development (Ács *et al.*, 2018).

Management incompetency is a well-cited cause of business failure (De Jager, 2017). Within upper echelons theory, top management and entrepreneurial characteristics are responsible for business survival and growth, or failure (Mayr *et al.,* 2020). Yet in the small business context, SME management underestimate their own responsibility and view external factors as more prominent causes (Franco & Haase, 2010). Overall, management performance is traditionally viewed as a key requirement for business success (Parida, 2016). For instance, financial management plays a key role in the longevity of SMEs because financial conduct is the core of the overall management system (Karadag, 2015).

Furthermore, entrepreneurial competencies and technology usage increases small business success (Radzi *et al.,* 2017). Such as high-performance work systems that are linked to higher levels of sales growth and innovation but providing employee benefits is costly for small businesses despite it increasing SMEs survival rates (Messersmith *et al*., 2018). In this vein, a strong strategic-orientation and learning-culture increases foreign market entry success for SMEs (Gnizy *et al.,* 2014). In the context of SMEs performance management, this article builds on the notable absence of research on EO linkages with business discontinuance. The article further focuses on the BRICS countries that are mainly efficiency-driven middle-income countries and who may benefit from research aiming to lower their business discontinuance rates, which is high in comparison to innovation-driven high-income countries (Singer *et al.,* 2018).

1.2. The BRICS

The economic and political formation of Brazil, Russia, India and China was in 2009, while SA only joined in 2011 (Nayyar, 2016). The BRICS countries' economic force is evident between 1980 and 2008, as their proportion of global GDP (in purchasing power parity) doubled to over 25 percent during this time (Nayyar, 2016) and climbed further to 31.3 percent in 2016 - outgrowing the G7 at 30.9 percent (Luna, 2020). However, this remarkable increase in the proportion of global GDP output is not equally distributed amongst the BRICS. China (9.5%) and India (6.1%) retained the highest annual GDP growth between 1981-2013, while Brazil (2.7%) and SA (2.4%) the lowest (Nayyar, 2016). The BRICS countries opened the New Development Bank (NDB) in 2016, which is seen as a challenge to global financial dominance by the USA and former G7 block. The NDB opened in 2016 to propel infrastructure development and economic growth in developing economies (Luna, 2020). However, trade and economic growth within the BRICS countries require more than the NDB, and trade openness and fewer trade restrictions are advocated for (Rani & Kumar, 2019). China's trade dominance at 75 percent of total trade between the BRICS countries is concerning (Nayyar, 2016). Despite the importance and economic power of the formation, a need of research

contrasting the BRICS SME sectors is evident. The current research contributes in this regard and is focused on links between innovation, technology absorption and internationalisation with business discontinuance - in the BRICS countries early-stage entrepreneurship (TEA).

1.3. The macro environment: global innovation, competitiveness and trade

Macro environment factors such as technology, economic growth, legal constraints and political factors such as trade agreements frame the competitive landscape and survival of SMEs. Innovation and international trade are particularly important in the context of entrepreneurship. This is because innovative growth-oriented entrepreneurs outperform the local and global competition (Singer *et al.,* 2018; Urbano & Aparicio, 2016). Innovation outputs are defined by improved products, services or processes which differ from that of the previous, thus replacing the old with the new (Dutta *et al*., 2019).

1.4. Global innovation

Global innovation rankings indicate how well economies fare with research and development, globally registered patents, technology, knowledge and creative outputs and infrastructure to support innovation (Dutta *et al.,* 2019). The top ranked innovators are largely the highest-income economies by GDP output (Dutta *et al.,* 2019). Findings show innovation stimulated economic growth in Eastern and Central European countries (Pece *et al.,* 2015). Furthermore, governments increasingly put innovation and entrepreneurship at the apex of their economic growth strategies (Fagerberg, 2015). According to the 2019 Global Innovation Index, the BRICS innovation rankings out of 130 countries, is led by China (14), followed by Russia (46), India (52), SA (63) and Brazil (66) (Dutta *et al.,* 2019).

1.5. Global trade

Global trade is dominated by well-developed economies that have high innovation rankings (World Trade Statistical Review, 2019). This dominance resulting from new technologies, particularly digital technologies such as the Internet of Things, artificial intelligence and 3D printing are significantly affecting “who we trade with, what we trade and how we trade” (World Trade Organization, 2018:9). Therefore, innovation and technology may be perceived as barriers to trade that protect those at the top of the innovation, technology and trade rankings. Consequently, it is not easy for developing nations to break through. In 2014, in the top 50 of global exporters of merchandise, the BRICS countries ranked as follows: China 1st, Russia 11th, India 19th, Brazil 25th and SA 40th (World Trade Organization, 2015). In 2017, China still occupied the top position, but with Russia down five places to 16th, India and Brazil both down one place to 20th and 26th, respectively, and SA up two places to 38th (World Trade Statistical

Review, 2019). Trends to be monitored are that consumer patterns, such as the shift to online shopping, are modified by digital technologies. In addition, digital technologies reduce trade costs, such as transportation and storage. Another expected shift is the eroding of traditional comparative advantage through, for instance, the 'workerless' factory or 3D printing. Consequently, these trends will further influence trade relationships, increase the importance of the service sector and keep innovative and knowledge-intensive economies benefiting further from such developments (World Trade Report, 2018).

1.6. Global digital competitiveness

The Institute for Management Development (IMD) World Digital competitiveness rankings provide further evidence of how technology adoption, knowledge and future readiness contribute to competitive advantages for top earning economies (IMD World Digital Competitive Rankings, 2019). IMD digital rankings consider three factors: (i) knowledge – the know-how required to discover and build new technologies, (ii) technology – the overall context that enables the development of digital technologies, and (iii) future readiness – the level of preparedness to exploit digital transformation. The IMD digital factors plainly resemble entrepreneurship in the discovery and bringing of innovation to market (Ács *et al.,* 2018). The top ten positions in the IMD rankings for populations greater than 20 million are dominated by high-income economies - except for China in 8th position. The other BRICS countries rankings are Russia 14th, India 18th, SA 19th and Brazil 24th.

1.7. Global prosperity

The background and statistics expounded above indicate how well-developed nations innovate, digitalise and produce newer and better products and services. Therefore, demand for their products and services remains high. The top five global traders are the USA, Germany, Japan, China and the Netherlands, as measured by their combined import and export values (World Trade Statistical Review, 2019). The same applies to exporting intellectual property, as international charging for the use of intellectual property is led by well-developed economies. This convergence shows that knowledge-intensive countries dominate world prosperity through their innovation- and knowledge-intensive industries - which relates to entrepreneurship. Therefore, countries who enjoy higher GDP rates couple their economic activity to entrepreneurship, innovation, digitalisation, high levels of exports and knowledge concentrated (patents and industrial processes) industries. This all emphasises impactful entrepreneurship which can better be understood within the EO literature.

2. THE LITERATURE - IMPACTFUL ENTREPRENEURSHIP AND ENTREPRENEURIAL ORIENTATION

Impactful entrepreneurship is opportunity-driven with growth intentions and business innovation and is global with at least 26 percent of sales from foreign customers (Bosma & Kelley, 2019). Entrepreneurial orientation theory describes innovative and opportunity-driven entrepreneurship that pursues business growth through processes and behaviours associated with risk-taking, proactiveness and innovation (Wales, 2016). Furthermore, EO is a strategic orientation which affects decision-making activity towards innovation, risk-taking and proactiveness which are positively associated with business growth performance (Zehir *et al*., 2015). Regarding the above tenets, this article links EO and impactful entrepreneurship as similar constructs. The GEM global research and the variable descriptions for this article are now discussed ahead of the methodology section to enhance the hypotheses formulations.

2.1. Global entrepreneurship monitor: total early-stage entrepreneurship and total early-stage entrepreneurship measures

For the past two (2) decades, entrepreneurship scholars are familiar with the term total early-stage entrepreneurship (TEA), comprising of start-up intentions and actual start-ups. Total TEA is the percentage of adults (18 to 64 years old) who are involved in the period immediately before and the first 42 months after a new business start-up (Bosma & Kelley, 2019). This is very useful to make sense of a country's state of entrepreneurship. For instance, wealthy OECD countries generally have low TEA rates coupled with low business discontinuance rates. The opposite is found in developing economies where high TEA rates correlate positively with high business discontinuance (Bosma & Kelley, 2019). Total early-stage entrepreneurship does not, however, necessarily indicate economic progress (Ács *et al.,* 2018; Van Stel *et al.*, 2005). Policy focus on TEA is partly justified through the high business closure rate of more than 50 percent within three years of opening, as stated earlier (Artinger & Powell, 2016), even before the business reach the established-business stage after 42 months (Bosma & Kelley, 2019). It seems economies need high start-up rates because many businesses will eventually close. Strong critics insist that high TEA is flawed as an argument supporting economic growth and prosperity (Ács *et al.,* 2018; Shane, 2009).

Van Stel *et al.* (2005) state that the argument of high TEA is flawed, because the consequences of low growth or business closure are negative for economic progress, as shown by regression analyses of the impact of entrepreneurial activity on stages of economic development between 1999 and 2003. Van Stel *et al.* (2005) conclude that poorer countries benefit very little because of high start-up rates only, because in comparison to SMEs, it is

large businesses who contribute more to higher economic growth in the long term. This argument is supported by Shane (2009) who provides evidence that businesses of at least ten years old provide over 60 percent of the USA's jobs. Similarly, Meyer and Meyer (2017) found that established businesses have a positive and significant impact on employment amongst BRICS countries. Therefore, business survival and growth in the long term is required for job creation and economic growth.

Within total TEA, the GEM research survey instrument measures business innovation, export intensity and new technology usage amongst early-stage entrepreneurs. The number of respondents who respond positively are calculated as a proportion of the total TEA. This study refers to these proportions as TEA subsets and calculates the following: TEA-innovation, TEA-new technology take-up and TEA-high export-intensity as illustrated in Table 1.

Table 1: Global entrepreneurship monitor total early-stage entrepreneurship measurement scales applicable to the study

(H_1) TEA-INNOVATION: DO YOU OFFER NEW PRODUCT/SERVICE IN A NEW MARKET?					
How many (potential) customers consider your product or service new/unfamiliar?			How many businesses offer the same products or services as you?		
1. All	2. Some	3. None	1. All	2. Some	3. None
(H_2) TEA-HIGH EXPORT-INTENSITY: WHAT PERCENTAGE OF FOREIGN CUSTOMERS DO YOU SUPPLY?					
1. 76%-100%		2. 26%-75%	3. 11%-25%		4. 1%-10%
(H_3) TEA-NEW TECHNOLOGY TAKE-UP: DO YOU USE LATEST TECHNOLOGY FOR YOUR PRODUCT/SERVICE?					
1. Very latest technology (newer than 1 year)		2. New technology (one to five years old)		3. No new technologies (more than 5 years old)	

Source: Adapted from the GEM 2018/2019 Global Report (Bosma & Kelley, 2019)

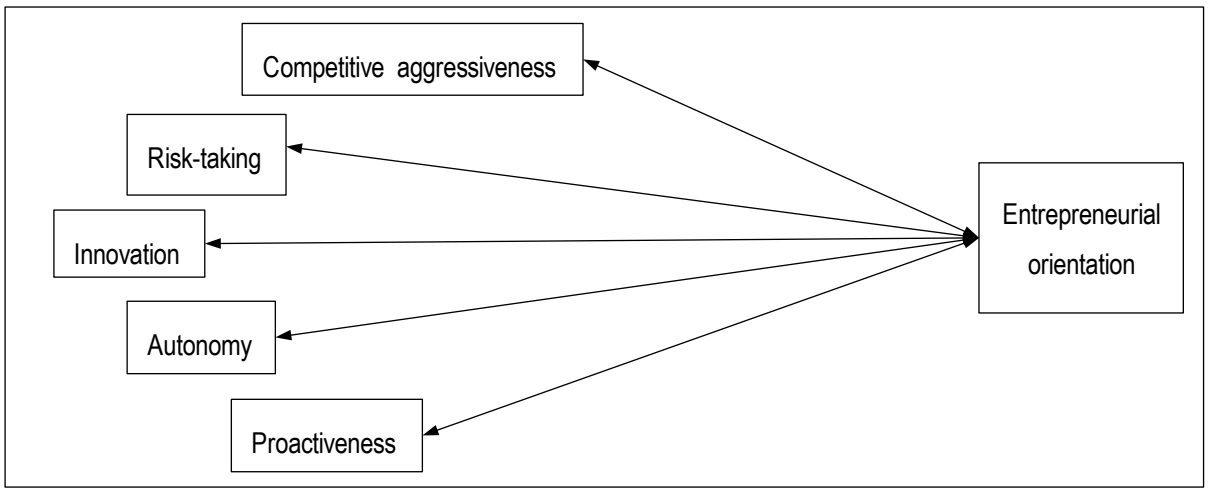
Table 1 indicates that the GEM Adult Population Survey (APS) measurement scales for TEA who innovate, are export intensive and use the latest technology. The APS also collects data on business discontinuance rates. The GEM TEA-innovation scale measures the number of businesses who consider their business product or service as new, as well as the levels of competition for the same product or service. This is the TEA-innovation scale as a latent variable for H_1 and represents how innovative and competitively aggressive a business is. Table 1 further shows that the GEM scale for TEA-high export-intensity measures the percentage of foreign customers a business supplies. Higher than 26 percent determines the

business as TEA-high export-intensity. Finally, the TEA-new technology take-up scale measures whether a business is using the latest technology. 'Newer-than-1-year' determines the business as TEA-new technology take-up. These two scales are the latent variables for H_2 and H_3 and represents how proactive, autonomous and risk-taking a business is.

2.2. The entrepreneurial orientation literature

Entrepreneurial orientation manifests in an organisation through entrepreneurial processes and behaviours associated with three (3) dimensions of risk-taking, proactiveness and innovation - in the original Miller/Covin and Slevin model (Wales, 2016). Lumpkin and Dess (1996) later expanded the dimensions to five by adding competitive aggressiveness and autonomy. Lumpkin and Dess (1996:138) explicitly argue that although the concept of EO may favour organisational analysis, one must observe classic economic views: the "entrepreneur is regarded as the firm". This argument links EO directly to the domain and control of the individual entrepreneur, and therefore, to business performance - and forms the broad basis for this article. Furthermore, upper echelons theory established that top management characteristics influences a business's strategic decision making based on their interpretations of the business environments they face, and this will determine business outcomes (Wood & Michalisin, 2010). Consequently, EO is the entrepreneur's responsibility for ensuring business discontinuance or survival. In agreement with Wales (2016), this article utilises the five-dimensions EO model as shown in Figure 1 to reduce fragmentation of the EO literature.

Figure 1: Entrepreneurial orientation dimensions model



Source: Wales (2016); Lumpkin and Dess (1996)

2.2.1. Entrepreneurial orientation - innovation and competitive aggressiveness

Innovation has become synonymous with entrepreneurship ever since Schumpeter (1947) argued that they are inseparable. Innovative entrepreneurs, according to the 2018/2019 GEM Global Report, are those who offer new products or services to all or at least some of their customers, and who have no or few competitors (Bosma & Kelley, 2019). Zehir *et al.'s* (2015) regression analyses study found that innovation performance impacts a business's ability to compete and prosper. Therefore, innovation can be linked to competitive aggressiveness, which is a business's ability to directly and forcefully challenge its rivals to gain a competitive advantage to outperform them (Lumpkin & Dess, 1996). Competitive aggressiveness may be due to price or a differentiation strategy. A differentiation or innovation strategy offers a unique or different product or service compared to competitors and is not generally associated with poor business performance (Zehir *et al.,* 2015). In the above premises, the TEA-innovation is used as a latent variable for the EO dimensions innovation and competitive aggressiveness. Consequently, it is expected that TEA-innovation is negatively correlated with business discontinuance rates. This is because in EO theory, stronger levels of innovation and competitive aggressiveness improve a business's competitive advantage and performance. On the preceding argument and rationale, H_1 is formed:

H_1: TEA-innovation and business discontinuance rates are negatively correlated.

2.2.2. Entrepreneurial orientation - pro-activeness, autonomy and risk

The EO literature extends to internationalisation as the term international EO refers to truly global businesses with sales in multiple export markets (Kuivalainen *et al*., 2007). A study by Hsieh *et al*. (2019) contends that the speed of internationalisation is influenced by entrepreneurial leadership, which refers to EO dimensions (proactiveness and innovation) and a risk-taking attitude. Research by Crant (1996) found that the proactive personality type is strongly correlated with entrepreneurial intentions, and the term proactive entrepreneur is defined as those who act to influence change in their environment (Bateman & Crant, 1993). Proactive entrepreneurs change business performance by seeking new-opportunity identification in the market (Zehir *et al*., 2015) coupled with idea generation and competitive strategic action (Kickul & Gundry, 2002). Identifying and pursuing international market opportunities has generally been understood within the Uppsala model as an incremental process. However, the Uppsala model does not consider 'born-global' start-ups, nor does it adequately explain the role of the entrepreneur in the processes of a business entering international markets, such as entrepreneurial alertness, judgement and networking (Hsieh *et al*., 2019; Forsgren, 2016). Autonomy in the context of EO refers to independent actions within

the SME management environment because decision-making is done by far fewer people, possibly one - the entrepreneur. Therefore, when compared to that of large businesses where decision-making are multi-person processes, the administrative process in SMEs is less complicated and has greater autonomy (Rahman *et al*., 2016). Consequently, the individual entrepreneur in the smaller business can act with autonomy and independently decide whether to take an opportunity, such as internationalisation and employing new technology.

In the above premises, the TEA-high export-intensity and TEA-new technology are used as latent variables for the EO dimensions of proactiveness, autonomy and risk-taking. The entrepreneurs themselves decide, plan and execute their internationalisation or technology adoption strategies - just as senior strategic management teams do in larger corporates. Consequently, it is expected that TEA-high export-intensity and TEA-new technology take-up are both negatively correlated with business discontinuance rates. This is because in EO theory, proactiveness, autonomy and risk-taking will improve business performance and growth. On the preceding argument and rationale, H_2 and H_3 are formed:

H_2: TEA-high export-intensity and business discontinuance rates are negatively correlated.

H_3: TEA-new technology take-up and business discontinuance rates are negatively correlated.

2.2.3. Inter-country hypotheses

The TEA activity levels of each economy in the BRICS group are expected to differ, which ostensibly will impact the findings of the study. Therefore, to first assess the TEA activity and business discontinuance variance amongst the BRICS countries, the following null hypotheses are formed:

- H_4: The distribution of TEA is the same across all the categories of country.
- H_5: The distribution of business discontinuance is the same across all the categories of country.
- H_6: The distribution of TEA-innovation is the same across all the categories of country.
- H_7: The distribution of TEA-high export-intensity is the same across all the categories of country.
- H_8: The distribution of TEA-new technology take-up is the same across all the categories of country.

Furthermore, macro-environment variance exists, such as levels of competitiveness and technology availability (IMD World Digital Competitive Rankings, 2019). SMEs management human capital (Radzi *et al.,* 2017; Parida, 2016), and export incentives available to SMEs, will

differ per country. It is beyond the scope of the article to control for these exogenous factors' direct influences on the main hypotheses, but the limitation is notable.

3. RESEARCH METHODOLOGY

This article aimed to determine the relationships between TEA-innovation, TEA-high export-intensity and TEA-new technology take-up, and business discontinuance rates in the BRICS countries. The study employed a quantitative research approach with quantitative data analysis using statistical methods in the Statistical Packages for Social Sciences. The study used empirical data collected in prior GEM APS global research and, for this article; the data was extracted between 2012 and 2015 from their online databases. The GEM APS is conducted annually by the GEM national team in their respective country; alternatively, the national team will procure a private data collection firm (Bosma *et al*., 2017).

3.1. Data collection

The GEM APS is administered to a minimum of 2 000 randomly selected adults (18 to 64 years old), in each participating country. Pilot surveys are conducted for data quality analysis. The APS is conducted as face-to-face interviews or by telephone. Data quality controls include error checks conducted on all submitted data, so that any data recording errors are corrected. Furthermore, the format for each data variable is harmonised between the participating countries. This enables comparisons of the data of GEM countries to be made because anomalies can be detected (Bosma *et al.,* 2017). The GEM data is only made available on their website three (3) years after a specific year's APS was conducted. The GEM data is, therefore, of high quality and the most comprehensive entrepreneurship data set available globally. The GEM variables utilised in this study are defined in Table 2.

Table 2: Defining and operationalising the variables

GEM code	Variable	Variable description
TEA	Early-stage entrepreneurial activity	Percentage of the 18 to 64 years old population (of participating country) who are either a nascent entrepreneur involved in setting up a new business but still below the first three months of opening, or owner-manager of a new business past the first three months but less than 42 months old.
TEAyyNPM	(i) TEA-innovation	Businesses operating for less than 3.5 years and offering new products or services to their customers, and with few or no competitors.
TEAEXP4C	(ii) TEA-high export-intensity	Businesses operating for less than 3.5 years and who have more than 26% of their customers outside the country.
TEAyyNTC	(iii) TEA-new technology take-up	Businesses operating for less than 3.5 years and who use technologies or procedures that are less than one year old, this is required for their product or service.

GEM code	Variable	Variable description
Discenyy	Business discontinuance	Percentage of the 18 to 64 years old population (of participating country) who shut down a business in the past 12 months.

Source: Adapted from the GEM 2018/2019 Global Report (Bosma & Kelley, 2019)

Table 2 indicates the variable descriptions. The TEA variables comprise TEA - this is the total TEA in a country - and TEA-subsets. The TEA-subsets are calculated as the percentage of the overall total TEA (i) who are selling new products in new markets, (ii) who have more than 26 percent of their customers outside the country, and (iii) who use the latest technologies or procedures (less than one year old) required for their product or service.

3.2. Data analysis approach

A correlation analysis was conducted using the Pearson product-moment correlation coefficient (Urdan, 2011), to establish the nature of the associations between the variables (Cohen *et al*., 2013). Furthermore, because of the small and non-equivalent sample, it was decided to conduct nonparametric hypotheses tests. They are better suited to establish the statistical significance of small sample t-tests and where variances between the independent samples are undetermined (Urdan, 2011). Both these parameters apply to the article's sample, size N=20, and the variances such as demographics and country size within the sample are not controlled for as stated earlier. Therefore, nonparametric Kruskal-Wallis Independent Samples tests were first conducted to determine if a significant variance of distribution exists between the BRICS countries. Finally, Pairwise Comparison tests were conducted for specific country-country variances because the Kruskal-Wallis test results will not indicate specific sample-sample variance such as how SA compares to India, Russia, etc (Cohen *et al.,* 2013; Urdan, 2011).

For the interpretations of the results, a correlation coefficient between -0.3 and +0.3 was considered weak, between 0.3 and 0.6 (positive or negative) moderate and above 0.6 (positive or negative) strong, as suggested by Urdan (2011) and Cohen *et al.* (2013). However, the interpretations of correlation coefficients strength are probabilistic at best and may not be entirely accurate or possible for prediction purposes (Cohen *et al.,* 2013). Interpretations, furthermore, depends on the context of the research being conducted (Schober *et al.,* 2018).

4. RESEARCH RESULTS

4.1. Nonparametric tests results

The Kruskal-Wallis and post hoc test results are discussed first to explain the inter-country variances within and between the samples. Then, the correlation tests results are discussed. The Kruskal-Wallis test results are presented in Table 3.

Table 3: Hypotheses test summary

	Null Hypothesis	Test	Test Statistic	Sig.
H_4	The distribution of TEA is the same across all the categories of country.	Independent-Samples Kruskal-Wallis Test	10.186	.037
H_5	The distribution of business discontinuance is the same across all the categories of country.	Independent-Samples Kruskal-Wallis Test	13.543	.009
H_6	The distribution of TEA-innovation is the same across all the categories of country.	Independent-Samples Kruskal-Wallis Test	16.386	.003
H_7	The distribution of TEA-high export-intensity is the same across all the categories of country.	Independent-Samples Kruskal-Wallis Test	15.929	.003
H_8	The distribution of TEA-new technology take-up is the same across all the categories of country.	Independent-Samples Kruskal-Wallis Test	17.170	.002
Significance level P<0.05 (95% Confidence)				

Source: Calculated from the APS survey results extracted from the GEM data between 2012-2015

The Kruskal-Wallis analysis of variance test results in Table 3 show all the p-values are less than the significance level of .050 - TEA (.037), business discontinuance (.009), TEA-innovation (.003), TEA-high export-intensity (.003) and TEA-new technology take-up (.002). Therefore, the null hypotheses are rejected. Having confirmed these significant variances exist between the countries, the post hoc tests were conducted using the Pairwise comparisons process for specific country-country variance. The Pairwise results are presented only where significant.

4.2. Pairwise comparisons results

Table 4 presents the TEA and business discontinuance results. Table 5 presents the TEA-technology, and Table 6 presents the TEA-high export-intensity and TEA-new technology take-up.

Table 4: Total early-stage entrepreneurship and business discontinuance pairwise comparisons of country

Country 1-Country 2	Test Statistic	Std. Test Statistic	Sig.
i. TEA			
Russia-Brazil	9.750	2.331	.020**
Russia-China	12.250	2.928	.003**
SA-China	7.250	1.733	.083*
ii. Business discontinuance			
Country 1-Country 2	Test Statistic	Std. Test Statistic	Sig.
Russia-SA	-11.250	-2.689	.007**
Russia-Brazil	11.000	2.630	.009**
India-SA	-10.750	-2.570	.010*
** P<0.05 (95% Confidence); * P< 0.10 (90% Confidence)			

Source: Calculated from the APS survey results extracted from the GEM data between 2012-2015

Table 4, firstly, shows significant difference in the mean TEA rates of Russia-Brazil, Russia-China and SA-China. Brazil has the highest mean TEA followed by China. Russia has the lowest TEA and SA the second-lowest. Secondly, the business discontinuance rate difference is significant between Russia-SA, Russia-Brazil and India-SA. South Africa has the highest business discontinuance rate, followed by Brazil. Russia has the lowest mean business discontinuance rate and India the second-lowest. Russia's low TEA rate coupled with low business discontinuance follows the trend associated with developed economies, where low TEA is coupled to low business discontinuance rates (Bosma & Kelley, 2019). South Africa's low TEA rate coupled with a high business discontinuance rate is an anomaly and this is a worrying indicator – that if this trend continues then the country will not progress towards increasing the established-business rate in the long-term.

Table 5: Total early-stage entrepreneurship-innovation pairwise comparisons of country

Country 1-Country 2	Test Statistic	Std. Test Statistic	Sig.
TEA-innovation			
Brazil-China	-7.250	-1.733	.083*
Brazil-SA	-12.500	-2.988	.003**
Brazil-India	-13.250	-3.167	.002**
Russia-India	11.250	2.689	.007**
** P<0.05 (95% Confidence); * P< 0.10 (90% Confidence)			

Source: Calculated from the APS survey results extracted from the GEM data between 2012-2015

Table 5 shows there is a significant difference in TEA-innovation rates between Brazil-China, Brazil- SA, Brazil-India and Russia-India. India has the highest TEA-innovation rate followed by SA. Brazil has the lowest and Russia the second-lowest. This infers that new businesses in India and SA are more conceivably to innovate than those in the other BRICS countries. While this article's finding contradicts the 2019 Global Innovation Index (Dutta *et al.,* 2019) - which rated China and Russia ahead of India and SA on innovation - the finding differs in the context of SMEs and early-stage businesses.

Table 6: Total early-stage entrepreneurship-high export-intensity and TEA-new technology take-up pairwise comparisons of country

Country 1-Country 2	Test Statistic	Std. Test Statistic	Sig.
i. TEA-high export-intensity			
Brazil-Russia	-8.250	-1.972	.049**
Brazil-India	-10.250	-2.450	.014**
Brazil-SA	-16.000	-3.825	.000**
China-SA	-10.500	-2.510	.012**
Russia-SA	-7.750	-1.853	.064*
ii. TEA-new technology take-up			
Brazil-China	-7.750	-1.853	.064*

Brazil-India	-13.750	-3.288	.001**
Brazil-SA	-13.750	-3.288	.001**
Russia-India	10.250	2.451	.014**
Russia-South Africa	-10.250	-2.451	.014**
** P<0.05 (95% Confidence); * P< 0.10 (90% Confidence)			

Source: Calculated from the APS survey results extracted from the GEM data between 2012-2015

Table 6, firstly, shows Brazil-Russia, Brazil-India, Brazil-SA, China-SA and Russia-SA have a significant difference in their TEA-high export-intensity rates. SA has the highest TEA-high export-intensity rate followed by India. Brazil has the lowest TEA-high export-intensity rate and Russia the second-lowest. Table 6, secondly, shows significant differences for TEA-new technology take-up between Brazil-China, Brazil-India, Brazil-SA, Russia-India and Russia-SA. India and SA have the highest means for TEA-new technology take-up, implying that their new businesses have a higher usage of technology, less than a year old, than those in the other BRICS countries. Brazil has the lowest mean TEA-new technology take-up rate and Russia the second-lowest. The correlation test results are shown in Table 7.

Table 7: Correlation results for the BRICS countries

1. Brazil					
	TEA	**Business discontinuance**	**TEA-innovation**	**TEA-high export-intensity**	**TEA-new technology take-up**
TEA	1				
Business discontinuance	-.990**	1			
TEA-innovation	-.865	.837	1		
TEA-high export-intensity	.820	-.870	-.462	1	
TEA-new technology take-up	-.182	.144	.652	.332	1
2. Russia					
	TEA	**Business discontinuance**	**TEA-innovation**	**TEA-high export-intensity**	**TEA-new technology take-up**
TEA	1				
Business discontinuance	.999**	1			
TEA-innovation	-.877	-.869	1		
TEA-high export-intensity	.971**	.979**	-.799	1	
TEA-new technology take-up	-.889	-.887	.988**	-.846	1
3. India					
	TEA	**Business discontinuance**	**TEA-innovation**	**TEA-high export-intensity**	**TEA-new technology take-up**
TEA	1				
Business discontinuance	.978**	1			
TEA-innovation	-.441	-.435	1		

TEA-high export-intensity	.957**	.992**	-.331	1	
TEA-new technology take-up	-.427	-.571	.670	-.553	1
4. China					
	TEA	**Business discontinuance**	**TEA-innovation**	**TEA-high export-intensity**	**TEA-new technology take-up**
TEA	1				
Business discontinuance	.574	1			
TEA-innovation	-.748	.114	1		
TEA-high export-intensity	-.617	-.332	.470	1	
TEA-new technology take-up	-.265	-.039	.278	.918*	1
5. SA					
	TEA	**Business discontinuance**	**TEA-innovation**	**TEA-high export-intensity**	**TEA-new technology take-up**
TEA	1				
Business discontinuance	.461	1			
TEA-innovation	.358	-.144	1		
TEA-high export-intensity	-.317	.226	.477	1	
TEA-new technology take-up	.635	-.367	.668	-.335	1
** P<0.05 (95% Confidence); * P< 0.10 (90% Confidence)					

Source: Calculated from the APS survey results extracted from the GEM data between 2012-2015

4.3. Correlation results

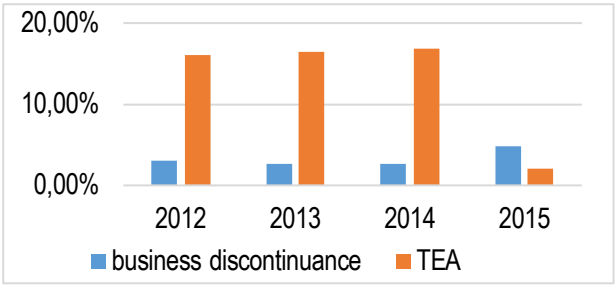
Table 7 shows the correlation results that are now discussed for each country before the results are summarised and compared in the discussion. The hypotheses predict that TEA-innovation (H_1), TEA-high export-intensity (H_2) and TEA-new technology take-up (H_3) are all negatively correlated with business discontinuance.

4.3.1. Brazil

Brazil has a near-perfect negative correlation between TEA and business discontinuance (-.990). However, this is an anomaly because all other BRICS countries have a positive correlation between TEA and business discontinuance. The anomaly is caused in 2015 when Brazil's TEA dropped steeply to 2.09 percent in comparison to a mean of over 16 percent between 2012 and 2014, as demonstrated in Figure 2. This was confirmed by the recession that Brazil experienced at the same time. The business discontinuance rate in the same year rose to nearly 5 percent from a three-year average of fewer than 3 percent. These anomalies are because Brazil's economy suffered a severe crisis from mid-2014 through to 2016, resulting from the political crisis and impeachment of then-President Dilma Rousseff.

Ostensibly this affected Brazil's results, which must be viewed in this context. H_1 and H_3 are not supported in Brazil as both TEA-innovation (.837) and TEA-new technology take-up (.144) are positively correlated with business discontinuance. This aligns with Brazil's lowest activity rate for both these variables, as seen from the Pairwise comparison results. H_2, however, finds support as TEA-high export-intensity is strongly negatively correlated with business discontinuance (-.870).

Figure 2: Brazil: Total early-stage entrepreneurship and business discontinuance comparison showing 2015 anomaly



Source: Calculated from the APS survey results extracted from the GEM data between 2012-2015

4.3.2. Russia

Russia's TEA rate is near-perfectly positively correlated with business discontinuance (.999). Both TEA-innovation (-.869) and TEA-new technology take-up (-.887), are strongly negatively correlated with business discontinuance, which supports H_1 and H_3. However, H_2 has no support as Russia's TEA-high export-intensity is strongly positively correlated with business discontinuance (.979). It is reasonable to infer that Russia's early-stage entrepreneurs do very well with innovation and new technology take-up but can do much better in supplying foreign markets.

4.3.3. India

India's TEA, similar to Russia, has a near-perfect positive correlation with business discontinuance (.987). H_1 and H_3 both find support with negative correlations between TEA-innovation (-.435) and TEA-new technology take-up (-.571) with business discontinuance. This infers that as India's early-stage entrepreneurs increase their innovation and technology adoption, they reduce their business discontinuance rate. However, H_2 has no support because there is a significant positive correlation between TEA-high export-intensity and business discontinuance (.992). This H_2 finding implies that India's early-stage entrepreneurs, similar to Russia's, are not faring well with exporting.

4.3.4. China

China's TEA rate, similar to Russia's and India's, correlates positively with business discontinuance (.574). H_1 is not supported as TEA-innovation is positively correlated with business discontinuance (.114). However, H_2 and H_3 are supported as TEA-high export-intensity (-.332) and TEA-new technology take-up (-.039) are negatively correlated with business discontinuance but weakly so. These findings imply that China can do better in these TEA activities to decrease business discontinuance, especially as they have the second-highest TEA rate of the BRICS countries.

4.3.5. South Africa

Total early-stage entrepreneurship in SA is positively correlated with business discontinuance (.461). H_1 is supported by a negative correlation between TEA-innovation and business discontinuance (-.144). TEA-new technology take-up is also negatively correlated with business discontinuance (-.367), thereby supporting H_3. No support, however, is evident for H_2 and similar to Russia and India, there is a positive correlation between TEA-high export-intensity and business discontinuance (.226).

5. DISCUSSION

Apart from Brazil's anomaly, all the BRICS countries total TEA and business discontinuance are positively correlated. This corresponds with GEM reports that business discontinuance generally follows TEA, especially in developing economies (Bosma & Kelley, 2019). However, this research article hypothesised that three subsets of total TEA are, in fact, negatively associated with business discontinuance. The research calculated the correlation between TEA-innovation (H_1), TEA-high export-intensity (H_2) and, TEA-new technology (H_3), with business discontinuance within the BRICS group of countries. The correlation test results for the hypotheses are summarised in Table 8.

Table 8: Summary of correlation test results

Country	H_1: **TEA-innovation**	H_2: **TEA-high export-intensity**	H_3: **TEA-new technology take-up**
Brazil	not supported (.837)	supported (-.870)	not supported (.144)
Russia	supported (-.869)	not supported (.979)	supported (-.887)
India	supported (-.435)	not supported (.992)	supported (-.571)
China	not supported (.114)	supported (-.332)	supported (-.039)
SA	supported (-.144)	not supported (.226)	supported (-.367)

Source: Own compilation from the correlation test results calculations

Table 8 shows the inconsistent support for the hypotheses. While the hypotheses test results are contradictory, the Kruskal-Wallis and Pairwise comparison tests did find significant variances between the BRICS countries. Therefore, it is expected that the correlation test results will differ. Furthermore, Table 7 shows that overall TEA is positively correlated with business discontinuance, a finding that agrees with Bosma and Kelley (2019), but Table 8 shows nine cases of negative correlations for the TEA-subsets. This indicates a measure of agreement with the theoretical grounding that EO is an approach to SME management that reduces business discontinuance. Moreover, a closer inspection of the findings and their context reveals the following.

5.1. Hypotheses discussion

H_1 declares: TEA-innovation and business discontinuance rates are negatively correlated. H_3 declares: TEA-new technology take-up and business discontinuance rates are negatively correlated. Russia, India and SA's correlation test results support H_1 in that innovation is associated with lower business discontinuance and this finding is supported by prior literature (Bosma & Kelley, 2019; Dutta *et al.,* 2019; Zehir *et al*., 2015). Entrepreneurs benefit and prosper from commercialised innovation (Ács *et al.,* 2018).

While Brazil's case does not support H_1 and H_3, the Pairwise comparison tests did find Brazil's TEA to be the least innovative and that Brazil has the lowest new technology take-up amongst the BRICS countries. This is consistent with the GEM 2016/2017 Global Report showing Brazil's innovation is extremely low, placing them 62nd out of 64 economies for TEA-innovation activity (Herrington & Kew, 2017). Furthermore, the 2019 Global Innovation Index rates Brazil 66th out of 130 countries, and they remain the least innovative of the other BRICS countries (Dutta *et al*., 2019). Therefore, the evidence convergence shows that Brazil must increase their innovation and technology absorption in their TEA sector. China's case also does not support H_1. Their case may be about density as they have the second-highest TEA rate and, by sheer country size, a far larger base of TEA. China's TEA-innovation proportion of total TEA needs to increase substantially before it is linked to lower business discontinuance. Findings show the greatest support for H_3 amongst the BRICS countries - apart from Brazil - in agreement with Radzi *et al*. (2017) that new technology usage increases small business performance and lowers business discontinuance.

H_2 declares: TEA-high export-intensity and business discontinuance rates are negatively correlated. The finding for H_2 is partly confounding. It is not expected that Brazil's case supports H_2, yet it does, despite Brazil having the lowest TEA-high export-intensity rate. Between 2012 and 2015, Brazil decreased their TEA-high export-intensity rate to near 0

percent, whereas their business discontinuance increased by over 50 percent during the same period. This divergence is due to their economic crisis during that time, as discussed earlier. Therefore, Brazil's support for H_2 is most probably distorted. China's support for H_2 links to their dominant proportion of global trade activity - they enjoy 75 percent of total BRICS exports and imports (Nayyar, 2016). This article's findings agree, showing that China's mean TEA-high export-intensity rate doubled between 2012 and 2015. China's doubling of TEA-high export-intensity is telling. Firstly, SMEs in China ostensibly benefit from their superior existing global value-chains linkages (Nayyar, 2016). Secondly, because their global trade is so prolific - there most probably are higher levels of born-globals in China - where EO dimensions of proactiveness, innovation and risk-taking attitude speed up internationalisation amongst new businesses (Hsieh *et al*., 2019).

Russia, India and SA all have a positive correlation between TEA-high export-intensity and business discontinuance and therefore do not support H_2. In conclusion, H_2 has the lowest support amongst the three hypotheses. This finding emphasises the challenge associated with breaking into global value chains (World Trade Organization, 2018) - especially SMEs who face the domination of global trade by well-developed economies (World Trade Statistical Review, 2019). One further result, although unexpected, is noteworthy: a consistent positive correlation between TEA-innovation and TEA-new technology take-up. This infers that innovation cannot do without new technology. This finding is consistent in all the BRICS countries with Russia being significant (.988), Brazil (.652), India (.670) and SA (.668) being moderate, but weak for China (.278). This finding highlights the IMD World Digital Competitive Rankings (2019) factors that emphasise technology and innovation exploitation is necessary to be competitive in an increasingly digital era.

6. CONCLUSIONS AND RECOMMENDATIONS

This article determined the relationships between TEA-innovation, TEA-high export-intensity and TEA-new technology take-up with business discontinuance in the BRICS countries. The literature was reviewed and based on existing theory, hypothesised the relations are all negatively correlated. While the hypotheses test results show inconsistent support, the contradictions were mitigated in the interpretations of the results. The research empirically shows that the indicators generally move in the direction they were hypothesised. This vindicates their theoretical grounding as a promising line of research. It is therefore concluded that higher rates of EO through innovation, new technology take-up and internationalisation within TEA sectors are associated with lower business discontinuance in the BRICS countries. The study findings have one vital implication, increased numbers of generic small business

ventures referring to those deficient of a strong EO for innovation, new technology use and internationalisation, are not necessarily good for accelerated economic growth. Due to the fact that it is entrepreneurial ventures, as opposed to generic small business, that are associated with lower business discontinuance and prosperity (Ács *et al.,* 2018; Shane, 2009). Therefore, the quantity of business start-ups in an economy is less important than qualities such as innovation and being growth driven. Why else, when overall TEA is highly positively correlated with business discontinuance, do the TEA-subsets that the study investigates find a good level of negative correlation with business discontinuance? Consequently, EO must be nurtured through well-crafted entrepreneurial policy and implementation within SME management practice, to foster and promote impactful entrepreneurs. The following are therefore recommended to enhance these qualities of new businesses within TEA.

6.1. Education, training and research

Entrepreneurship scholars must increase their differentiation from generic entrepreneurs to impactful entrepreneurs (Ács *et al*., 2018; Bosma & Kelley, 2019). An unexpected study finding revealed that innovation and new technology take-up are positively correlated - the one is seldom without the other. Entrepreneurship educators must be mindful of this with programme design. Furthermore, findings in some cases showed very low levels of innovative growth-oriented entrepreneurship activity amongst a mass of generic entrepreneurs who are low growth, without innovation or new technology usage. Therefore, programme content and delivery must consider innovation, new technology take-up and growth aspirations such as internationalisation as interlinked. Universities and university research centres can advance new technologies and innovation in selected high-growth industries as can be seen in Nordic countries (Fagerberg, 2015).

6.2. Governmental

Support, in particular with technology and digitalisation, is required to boost innovation. As stated earlier, the study finds innovation and new technology take-up are positively correlated amongst all the BRICS countries' TEA. This concurs with the fact that governments who invest in digital infrastructure such as high-speed broadband access, provide the necessary infrastructure for SME innovation and competitiveness (Dutta *et al.,* 2019). Digital capabilities increasingly provide the platform for business-to-customer and business-to-business innovations (Tumbas *et al.,* 2015). Public-private partnerships that provide access to digital infrastructure, such as university laboratories and incubators with specific focus areas on innovation, technology development, technology absorption and diffusion can be prioritised

for SMEs. The authors concur that policy must support greater linkages for innovation and market opportunities to extend SME trading between BRICS countries (Rani & Kumar, 2019).

6.3. Investors

As prior research has shown, astute selection criteria increase the return of investment in SMEs, and venture capital has positive relationships with SME growth (Fraser *et al*., 2015; Shane, 2009). The findings support choosing innovative entrepreneurs with growth aspirations for investment. Providing financial capital, seed-funding or venture capital can propel an innovative entrepreneur with growth potential towards greater success. This, however, often depends on monitoring which venture capitalists may provide to their recipients because finance alone is not the solution to SME growth challenges (Haselip *et al.,* 2015).

6.4. Policymakers

This article's findings show that internationalisation is a weakness in the TEA sectors studied, resulting in poor support for H_2. Therefore, the authors advocate that trade policy measures must incentivise SMEs to boost their innovation, technology development and technology diffusion and absorption. This will raise export potential in general. More specifically, SMEs need access to global value chains, and politics and policy can be barriers. Global trade is in the era of born-globals (Hsieh *et al.,* 2019). Digital technology in transport and communication enable and reduce trade costs (World Trade Report, 2018). Barriers that curb innovation include regulatory and market obstacles such as insufficient demand, which are as important to address in addition to providing direct financial support. In the context of BRICS, it is concurred with Rani and Kumar (2019) in their support of trade openness, fewer restrictions and incentives within strategic trade policies.

7. LIMITATIONS AND FUTURE RESEARCH

The current study contributes to the theory and practice of EO and entrepreneurial management of SMEs. However, limitations which included limited access to data availability were faced. The GEM consortium releases their data three (3) years after the APS is conducted. Therefore, the study worked with a smaller sample size that reduced the statistical power of the data analysis. A further limitation was finding a timeframe where all the BRICS countries consecutively participated in the GEM. The BRICS countries all participated in the GEM research during this study's timeframe - apart from Russia in 2015 - a moving average was therefore calculated for 2015 from their prior three years of GEM data. Future research in this regard will benefit from larger data sets over longer timeframes to increase the statistical power and results. Furthermore, the article observed an extremely low frequency of certain

TEA variables from the frequency tables compiled. This is seldom reported on. Future research may consider the source of low innovation, technology take-up and poor internationalisation in SMEs to uncover reasons why entrepreneurs steer away from being innovative, tech-savvy and going global.

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