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INNOVATION FOR TECHNOLOGY

**ASSESSING THE FACTORS
INFLUENCING
SME INNOVATION
IN MAURITIUS**

Final Report

October 2018

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MAURITIUS RESEARCH COUNCIL

Report on the study
*“Assessing the factors influencing
SME innovation
in Mauritius”*

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EXECUTIVE SUMMARY

The purpose of the present study is to assess the factors that influence innovations among small and medium enterprises in Mauritius, being given the increasing importance of SME's in the Mauritian economy. The main objectives of the research were to (i) identify and measure factors that promote innovation among SMEs; (ii) identify and measure barriers to innovation in SMEs; (iii) propose strategies to mitigate effects of barriers to innovation and (iv) propose strategies to drive SME innovation.

Following a thorough review of extant literature, a mixed methodology was proposed. Data were collected by means of a questionnaire administered to a targeted sample of 200 SMEs from 18 different sectors out of a population estimated at 12,219 operational SMEs registered at the SMEDA in 2016. In addition, using a qualitative approach, a number of face-to-face interviews were conducted with a cross-section of stakeholders, entrepreneurs and policymakers.

Findings of the study revealed that two main composite aspects, namely 'Financial Assistance Aspect' and 'Personality Aspect' were the main drivers of innovation. The two main composite aspects acting as barriers to innovation were found to be the 'Business Model Aspect' and the 'Collaboration Aspect'.

Therefore to promote SME innovation, the study recommended: (i) that Innovation be demystified; (ii) the creation of structures to ensure good return on investment in innovation grants/packages; (iii) the recognition of the relevance of an entrepreneurial culture and (iv) a national guideline to SME innovation/growth.

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LIST OF ABBREVIATIONS

CEO: Chief Executive Officer

CIE: Creativity Innovation Entrepreneurship

CSO: Central Statistics Office

DBM: Development Bank of Mauritius

EDB: Economic Development Board

EO: entrepreneurial orientation

GI: General Innovativeness

HRMPs: Human Resource Management Practices

IPR: Intellectual Property Rights

KMO: Kaiser Meyer Olkin

LEMS: Leasing Equipment Modernization Scheme

MCCI: Mauritius Chamber of Commerce and Industry

MSME: Micro, Small and Medium Enterprises

NWEC: National Women Empowerment Council

PCA: Principal Component Analysis

RHT: Rose Hill Transport

SI: Specific Innovativeness

SME: Small and Medium Enterprises

SMEDA: Small and Medium Enterprise Development Authority

SMIDO: Small and Medium Industries Development Organization

WTO: World Trade Organization

1. INTRODUCTION

During the past decades, a mounting surge of interest in developing the Small and Medium Enterprises (SMEs) has been noticed and consequently, SME development in Mauritius is not an anachronism to the Mauritian Economy as it dates back to the 1960's.

SMEs prominently feature as the backbone to economic development and employment growth (Ramayah et al, 2015) and there is a growing recognition that poverty reduction lies in the emergence of SMEs. Till now, although up to date data are difficult to obtain, estimates suggest that more than 95 per cent of enterprises across the world are SMEs, accounting to around 60 per cent of employment (Ayyagari et al, 2011). Industrialized countries like Japan, India and South Africa lead in the number of SMEs with a percentage of 99 percent of all enterprises (EIU, 2010), 80 percent of all the country's businesses (Ghatak, 2010) and 91 percent of formal business entities (Abor and Quartey, 2010) respectively. The contribution of SMEs to economic fundamentals varies from 16 percent of GDP in low income countries to 51 percent of GDP in high income countries (Growing the global economy through SMEs, Edinburgh Group, 2012).

In Mauritius, currently, SMEs contribute to around 40 per cent of GDP and 55 per cent of employment (SME Master Plan, 2017) and the concentration of SMEs per 1000 Mauritian inhabitants is 98. Noting that with a concentration of 34 per 1000 inhabitants, SMEs in Singapore contribute around 50 per cent to GDP and 70 per cent to employment, the potential of our local SMEs is currently underexploited. Since the Government of Mauritius focuses on immediate growth and job creation, the SME support institutions and the SMEs from the private sector should act in a pragmatic way and make the miracle happen. Many incentives such as the creation of the Small and Medium Enterprise Development Authority (SMEDA) in 2009, restructured into SME-Mauritius Ltd (2017), with the foremost aim to provide management-based and skill-based programs to the entrepreneur were implemented and recently, a Legacy Sovereign Fund was allocated to the SME sector (PwC, Budget 2016).

With globalization, many challenges and opportunities have emerged and developing countries like Mauritius have to struggle with them. SMEs as an engine for economic growth can bring economic success to Mauritius by changing our way to conduct business and by bringing innovative products and relevant techniques to capture the international and domestic markets. Empirical studies revealed that a fast growing, job creating innovative

entrepreneur has much appeal because this practice corresponds to the Schumpeterian ideal-type (Coad and Reid, 2012; Daunfeldt et al, 2015; Coad, et al, 2015).

1.1 Statement of the Problem

Increasing globalization can negatively affect the SMEs more than the large enterprises and competition from low cost producing countries makes their situation even weaker. Innovation should be the rule of thumb as innovation in whatever form has the potential to convert a firm's weakness into an opportunity. The Government of Mauritius realizes the increasing importance of SMEs in transforming our Economy from a middle-income economy to a high-income economy, and it is making an enormous effort to position this sector as one of the main pillars of the economy: For example, in Budget 2015-2016, around 10 Billion MUR was earmarked to support SME expansion and growth nationally, regionally and internationally, in addition to the cost of operating various support institutions like SMEDA (now SME-Mauritius Ltd), Enterprise Mauritius (now EDB) and others as well as the internal costs of innovation for the SMEs. However, compared to other developed countries, innovation among SMEs in Mauritius does not appear to be quite prominent. One reason could be that SMEs have high failure probability, shorter life span and high income volatility (Nilsson, 2008). It is believed that considerable public funds may be wasted if the SMEs do not survive and grow while remaining competitive.

Since innovation acts as the catalyst for sustainable growth, it is crucial to overcome the barriers while at the same time facilitate the SMEs innovation. In this context, this study aims at identifying the key barriers and drivers of innovation among SMEs with a view to propose innovation strategies.

1.2 Significance of Study

While extant literature abounds on research on SME innovation in various parts of the world, there is little or no research that has been conducted in the context of the Mauritian business environment which is a developing small island state with a relatively small market. The findings of this study will not only fill the research gap but will also help policy and decision makers like the government which acts as facilitators of business innovation and also the entrepreneurs from the SME sector who seek to innovate their business.

1.3 Purpose of Study

1.3.1 Aim

The general aim of this study is to identify and critically assess the major drivers and barriers to innovation in Mauritian SMEs.

1.3.2 Objectives

The specific objectives of the study are to:

- Identify and outline factors that promote innovation among SMEs.
- Identify and outline barriers to innovation in Mauritian SMEs.
- Propose strategies to mitigate the effects of barriers to innovation.
- Propose strategies to drive SME innovation.

1.4 Assumptions

For this study, quantitative approaches have been used and numerous assumptions were made namely:

- For the quantitative approach, only the small and medium enterprises were targeted. The Micro enterprises were excluded as it was assumed that they were less likely to opt for innovation.
- Further, the inclusion criteria for the sample of SME entrepreneurs was based on the stratified random sampling i.e. out of each sector, a proportionate sample was derived.
- It is assumed that the responses recorded were not biased.
- It is assumed that the sectoral distribution of SMEs in the sampling frame was representative of the population.

1.5 Limitations

Our study had some limitations that need to be mentioned:

For the quantitative approach, the targeted sample of SME entrepreneurs were 200 out of a population of 122, 600 'small establishments' as estimated by the Central Statistics Office (CSO, 2014), the CSO definition of 'small establishments' being those employing less than 10 persons. The Mauritius Chamber of Commerce and Industry (MCCI) mentioned a figure of 108,000 SMEs (www.mcci.org, 2015). The SMEDA Act however defined SMEs as those having a turnover of Rs 10- 50 millions. In 2016, 12,219 SMEs were registered at SMEDA of which 1,268 benefitted from assistance on their current schemes. We considered this figure

as our sample frame in the absence of accurate figures for the total number of SMEs (as per SMEDA Act definition).

Given this constraint, we adopted a convenience sample of 200 SMEs as our target, stratified based on the sectoral distribution of operational SMEDA-registered SMEs. We assumed that the sectoral distribution of the subsample was representative of the whole Mauritian SME population.

1.6 Theoretical and Conceptual Framework

1.6.1 Definition of Innovation

Innovation has always been regarded as an essential component in business sustenance and competitiveness of developed nations who are unable to compete on cost (Wagner, 2007). Thompson (2013) proposes that innovation is an implementation of new process of production, supply and distribution as well as introduction of changes in management, work organization, conditions and skills of the workforce in order to improve the firm's performance.

An open innovation is a two-way process which uses both internal and external knowledge such as resources and ideas in a creative approach so that the business grows and captures most of the market (Lindegaard, 2010). Conversely, in a closed innovation model, research and development is performed within the organization; thus less or no external knowledge is used. For instance, the Apple Company usually brings in new products, developed in a closed innovation model. Many SMEs adopt this closed technique and strategically protects their internal ideas and technologies from competitors. Some SMEs focus less on innovation management due to lack of skilled personnel and finance (Wagner, 2007).

According to Tidd & Bessant (2009), SMEs innovations have both advantages and disadvantages (constraints) as highlighted below:

Advantages	Disadvantages
Rapidity in decision making	Lack of adequate structures intended for management control, for example development period and expenses
Unofficial culture	Deficient in access to vital resources, particularly finance
Reliable communication network for everyone to stay updated	Lack of access to proficiency and knowledge
Communal and focused vision	Lack of durable policy and trend
Flexibility, quickness	Lack of structure and succession planning
Entrepreneurial spirit and risk taking	Poor risk management
Energy, enthusiasm, passion for innovation	Lack of application to detail, lack of systems
Good networking internally and externally	Lack of access to resources

Table 1: Advantages and Disadvantages of SME Innovation
adapted from Tidd & Bessant 2009, p 61 (Adebayo, 2014)

1.6.2 Types of Innovation

As per the Oslo Guide 2005:52, there are four types of innovation (Tidd et al, 2005; Davis, 2005) which include:

- Product innovation. This involves the launching of new products and services to market and major improvements in the usefulness and characteristics of the existing goods and services.
- Process innovation. It includes major changes in stage of production, tools or software.
- Marketing innovation. The aim is to improve customer satisfaction and needs by relocating the product to a new market or by opening new markets.
- Organizational innovation. This involves a restructuring of the hierarchical organizational structure and improvements in the commercial practices and external relations of a firm.

Innovation can also be in the form of the Schumpeterian type which includes five innovations techniques with almost the same innovative approaches as mentioned above except that Schumpeter (1934) suggested that innovation also occurs when there is a new source of supply for raw materials.

Conversely, two major types of innovation adopted by SMEs are the incremental and the radical innovation (Christensen 1999, Abernathy & Clark 1985). Incremental innovation refers to improvement and changes in the technical components of a firm and is generally preferred by the SMEs as compared to the radical innovation where there is a complete change in the technological and organizational structure (Gungaphul & Ramnarain, 2011).

1.7 Small and Medium Enterprises in Mauritius

During the past decades, Mauritius has witnessed an emergence in the SME sector: In 1993, with the implementation of the Small and Medium Industries Development Organization (SMIDO) Act and the establishment of support institutions such as the Small and Medium Enterprises Development Authority (SMEDA), the National Women Empowerment Council (NVEC) and the Development Bank of Mauritius (DBM), the SME sector has flourished.

To provide a legal framework for the SMEs, the SMEDA Act was promulgated in 2009. It defines the SMEs based on a turnover criteria rather than on a sector-specific basis and there is an utmost need to differentiate between small and medium enterprises because the medium-sized enterprises are generally more sophisticated and technology-based and require different support measures as compared to the small enterprises which are classified more by their ‘developmental’ level of operations.

According to the European Commission (EC), a medium-sized firm is one which has an annual turnover of more than 10 Million Euro but not more than 50 Million Euro whilst the small firms are those with a turnover not exceeding 10 Million Euro (Table 2).

Enterprise Category	Headcount Turnover (in EU)	Balance Sheet Total (in EU)
Medium Sized	< 250	≤ 50 Million
Small	< 50	≤ 10 Million
Micro	< 10	≤ 2 Million

Table 2: Defining SMEs as per the European Commission
(Soini & Veseli, 2011)

In the SMEDA Act (2009), a small enterprise is defined as one that reaps an annual turnover of not more than 10 Million MUR and a medium Enterprise is an enterprise which has an annual turnover of more than 10 Million MUR but not more than 50 Million MUR.

2. LITERATURE REVIEW

2.1 SMEs Innovation in Mauritius

In a global economy driven by intense competition, small and medium-sized firms must find ways to stand out from their competitors and create tighter bonds with their customers. Innovation has been shown to be positively related to the firm's performance (Dossi, 1988). In Mauritius, one of the weaknesses of the SME sector is its weak technology/innovation base (Industrial and SME Strategic Plan 2010-2013, 2009; Gungaphul & Ramnarain, 2011); thus a series of measures should be undertaken to strengthen the SMEs through innovation.

The local enterprise 'Conserverie Sarjua Internationale Ltee' is a good example of how innovation can lead to economic success: This SME started as a pickle manufacturer and over the years, has innovated and diversified its products by producing ethnic foods such as pickles and jam using local and rare fruits with unique recipes. It has also introduced a range of tea with an array of flavors. 'Conserverie Sarjua Internationale Ltee' has achieved international recognition through its highly innovative products and its '*betel tea*' was selected as the Trends and Innovation 2006 at the 'Salon International de l'Alimentation' in Paris'.

'Sotravic Ltee' is another SME success story: In 2011, it gained recognition when the TECOMA Award was awarded to its entrepreneur. This enterprise started as a 'civil and construction firm' (Sotravic Ltee Website, Gungaphul & Ramnarain, 2011), and through expansion of its resources, 'Sotravic Ltee' now leads the market for pipeline construction. It has even integrated the 'Multi-Billion Rupee electro mechanical irrigation market' where it holds 50 per cent of the market share. On an international perspective, 'Sotravic Ltee' works in close partnership with overseas specialist partners who appreciate the expertise of this firm.

In a bottom line approach, there are reasons to believe that SMEs in Mauritius can emerge appreciably provided that they innovate. Thus it is important to identify the major factors that would trigger SME innovations in Mauritius. This would help policy makers and decision makers in their mission to provide facilities to encourage innovation among small entrepreneurs. It will also be useful to the entrepreneurs themselves to identify new ways for innovations.

2.2 Factors that can promote SME innovation in Mauritius backed with empirical evidence

In an era of intense competition on a global scale, the creation of SMEs does not guarantee a flourishing Mauritian Economy but innovation being a core aspect to convert a SME's weakness into an opportunity (Drucker & Gaynor, 2002), should be the order of the day. Internal factors like product, process and marketing innovation and the company culture and external factors like access to external financing, the legal regulations, bureaucracy of institutions and crisis and instability can influence innovation within an SME in Mauritius. In this optic, for this study, the following factors are being considered:

2.2.1 Financial Resources can help SMEs to innovate.

Access to finance is an important factor that can encourage innovation within an SME (Cassar, 2004; Popov and Roosenboom, 2013; Kim et al, 2016). In this context, the Government of Mauritius is providing fiscal benefits in terms of tax credits, improving access to finance by continuing the SME Financing Scheme (which will provide a grant of MUR 50 Million to young entrepreneurs) for the next three years, by creating a National SME Incubator Scheme and finally through reintroduction of the Leasing Equipment Modernization Scheme (LEMS), leasing finance will easily be accessible (Budget 2016-2017). In this way, the government of Mauritius indirectly supports the SMEs to indulge in innovative activities. Another way to provide financial assistance and promote SME innovation can be through the organization of television shows like 'Le Boss' in collaboration with SME Banks, which will encourage local SMEs to participate and fight for their innovative ideas to win financial benefits and other assistance to help their firm grow.

A study conducted by Myeni (2011) revealed that the Swaziland Industrial Development Company offered financial assistance to the Swaziland SMEs' banks so that they can innovate on financial products including Standardized Administration, Product feasibility, Scorecard Metrics, Risk Profiling and Loan Amount thus accelerating the screening, appraisal and decision on loan requests.

2.2.2 Technology as a promoter of Innovation

In a survey among 2100 SMEs, 59 per cent of the respondents believed that technology can help them innovate (Global SME Mindset, 2013). Usually, the productivity of SMEs is low when they use inefficient technology and due to a lack of finance, they are even unable to improve the technological aspects; thus the SMEs are unable to compete on the global market

(OSMEP, 2007a). Therefore, as per the World Bank (2009), investments in technology will improve the quality of production by generating higher value added commodities and in this way; technology is a factor that can directly promote innovation within a SME.

In Mauritius, to provide modern production techniques, a pilot Agri-Business Park, two SME industrial Parks and the DBM Industrial Zone will be created (Budget 2016-2017). It was proposed by Gu Linzhou and Shao Yunfei (2015) that technological innovation improves product quality when assessing the relationship between innovation and business performances. In the Sichuan Province, 174 SMEs were questioned using a Likert-Scale questionnaire and results revealed that through the use of SMEs Technology Innovation Fund, technology positively impacted on SME's performance. In Cote D'Ivoire, it was argued that by increasing the use of technology by SMEs, sustainable development can be achieved in the country. Therefore, in Mauritius, if proper technological resources are provided, SMEs can increase their productivity as well as opt for product innovation and process innovation.

2.2.3 Research and Development Activities

As per the Frascati Manual (2002) and Oslo Manual (2005), Research and Development form part of the technological innovation and the interactive model developed by Kline et al (1986) consider R&D as a tool to solve problems occurring during the processes of innovation. In this way, the R&D can contribute to the achievement of radical innovations that provide greater competitive advantage (Vieities et al, 2010). R & D can improve the technological resources and as a result, by the use of advanced tools, SMEs can improve their quality of product.

2.2.4 Human Resource Management Practices can promote SME innovation

Human Resource Management Practices (HRMPs) in terms of recruitment and job security only, are known to be significant predictor. Ngah & Ibrahim (2009) found that HRMPs cater for 57 per cent of variance in innovation and by creating friendly working environment, a good employee-employer relationship and by promoting team work and collaboration, the SMEs' performance and innovative activities can be enhanced.

In Mauritius, the SMEDA was set up to help the SMEs grow through the provision of management based training programs which shall in turn improve the human resource management, communication skills and managerial capacity building skill of the entrepreneurs. In this way, the latter can undertake High Performance Work Practices

(HPWPs) like selective hiring which involves establishment of specific job requirements, onboarding which involves providing on the job training to new recruits, autonomy where employees have greater freedom of choice in the way work is done, financial incentives where a percentage of profits reaped are shared among the employees, establishment of a sense of equality among employees and finally providing job security (Mazzai, Flynn and Haynie, 2015) to boost creativity within SMEs.

2.2.5 Creativity

Many believe that to ensure the survival of an organisation, the launch of innovative products and services with advanced technology, is vital but the former requires creativity, innovation and entrepreneurship (Fadaee and Alzahrh, 2014). Drucker even proclaimed that entrepreneurship, without creativity and innovation does not bear fruits. Thus in SMEs, by being creative, the entrepreneur can capture market opportunities.

In Mauritius, during the past 60 years, one major innovative firm has been the Rose Hill Transport Limited which has consolidated its business models by introducing new and high-tech bus and this has led to an increase in the activities of the group with healthy profit. Therefore, by developing new ideas and introducing new processes, the firm's performance can be boosted.

2.2.5.1 Creativity, Innovation and Entrepreneurship (CIE) Model

Creativity is one of the foremost factors that can sustain the growth of SMEs. Schaper & Volery (2004) proposed the Creativity, Innovation and Entrepreneurship Model which illustrates the relationship between creativity, innovation and entrepreneurship as a process model (Figure 1). This model is divided into a number of interdependent stages, for instance creativity is a prerequisite for innovation and entrepreneurship follows innovation.

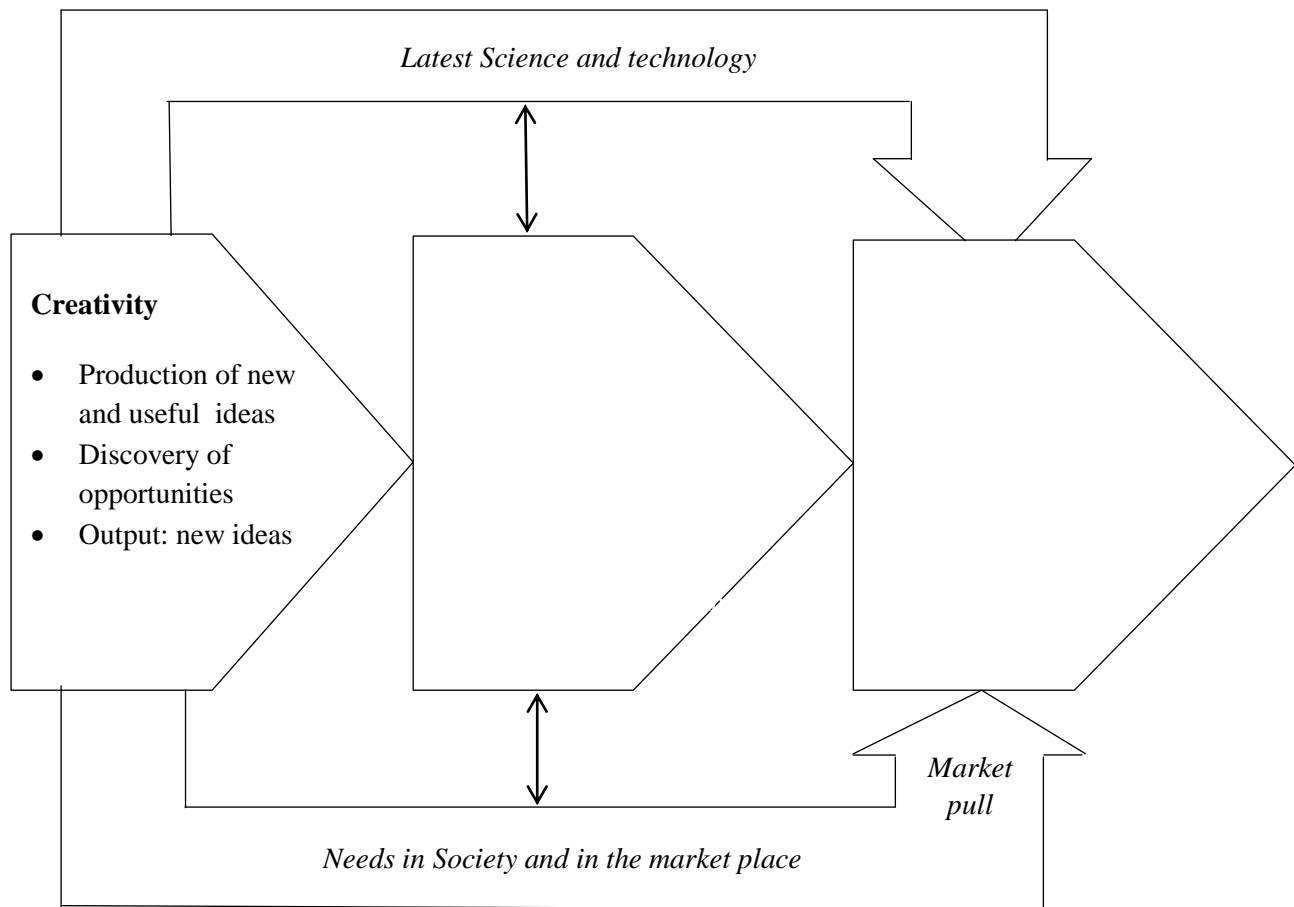


Figure 1: Creativity, Innovation and Entrepreneurship model
adapted from Schaper M & Volery T (2004)

With the rapid changes and the launch of innovative products and services, creativity, innovation and entrepreneurship are required to sustain SMEs. Creativity, being an intellectual activity to create idea, innovation being the ability to convert creativity into action or result (prototype) and entrepreneurship being a process that occurs in the economy through innovation and people who react to economic opportunities and creating value for society and individuals (Kantylyvn, 2014) are interdependent. Kynb (2005) argued that creativity, innovation and entrepreneurship can together enhance educational and career success therefore market pull factors and technological factors (Schaper and Volery model), being the key drivers can help in re-enforcing this relationship. Market pull is actually an innovation developed in response to an identified market need, in contrast technology push implies that a new invention is pushed through Research and Development, production and sales, and enters onto the market without consideration of whether or not it satisfies a user's need. Therefore, as per the CIE model and Drucker (Fadaee & Alzahrh, 2014),

entrepreneurship without innovation and creativity, cannot reap fruits and this statement validates the model proposed by Schaper & Volery (2004).

2.2.6 Business Models

Business Models is one (and the most essential) of the five types of innovation (Schumpeter 1934) and it is the research for new logics (Amit & Zott, 2001) in order to generate better revenue for the firm. The enabling environment plays an important role and this makes the business and the product more attractive to the market. In a study, it was found that by turning around their business models, the SMEs in Finland were able to re-create and re-deliver better offering on their products in the market place (Adelakun, 2014). In Mauritius, the Rose Hill Transport (RHT), unlike most other bus companies, was able to reap healthy profits and dividends after the introduction of high tech buses and this was mainly due to its consolidated business models. In fact, as mentioned earlier, RHT was able to make good use of the opportunities that arises after innovating their transport services, thus the former's performance has improved. Former Food and Allied, now Eclosia (Mauritius), also amended its business model by introducing the franchise method and consequently, the 'Chantefrais' brand was created and now, Food and Allied operates directly with its consumers, thus is able to fulfill their requirements by undertaking innovative products and processes.

2.2.7 Contingent Factor - Company Size

Calvo et al (2000), Buesa et al (1998) and Mansfield (1981) studied the relationship between size and innovation and they noted a positive link between the firm size and innovation behaviour. In addition, Audretsch (1991, 1995) suggested that the SMEs have more ability to innovate than large enterprises despite that the small businesses are not able to conduct large research and development activities- this is acknowledged in the Oslo Manual (2005).

2.2.8 Entrepreneur Traits

In an SME, the CEOs play a dominant role (Burger- Helmchen, 2008) because due to their influential and powerful position, their personal views and traits can affect the firm's performance and strategic direction (Peterson et al., 2003; Judge, Piccolo, and Kosalka, 2009). Therefore, an entrepreneur with positive traits like preference for innovation will encourage the firm to innovate (Stewart, Watson, Carland, 1999) whilst entrepreneurial orientation (EO) which consists of entrepreneurial aspects of decision making like proactiveness and risk taking will be used to run the firm. For instance, a firm with low EO

will hesitate to innovate and to undertake risky projects as compared to an SME with high EO which through innovation; will compete to maintain its position in the market.

2.2.9 Competition can promote SME innovation

Another factor that can trigger innovation within a SME is intense competition on a global scale. On one hand, this intense competition could threaten the survival of SMEs whilst on the other hand, it encourages the firms to improve their productivity to spur growth (Dinh, Mavridis & Nguyen 2010, 11). To compete on the local and international markets, SMEs can undertake product innovation as well as marketing innovation. In Mauritius, the SMEs operating in the manufacturing, electronics, engineering sectors undertake mostly incremental innovation (Stringer, 2000) in the sense that they satisfy the customer needs by targeting new market segments, by launching new products and services and by changing the business models and production techniques.

Appiah-Adu & Singh (1998) showed that there is a link between customer orientation, new product success and firm's performance and thus it can be concluded that innovation is vital. Shigang Yan (2010) reported that key competitive strategies like cost, differentiation and innovation strategy were used by China's SMEs to compete and using the data collected from the firms, it was also revealed that competitive strategies are important to achieve competitive advantages. However, a negative relationship was shown to exist between competitive pressures and SMEs' performance.

2.2.10 Cooperation among Institutions

Narula & Dunning (1993) argued that by encouraging collaboration among the different institutions responsible for the betterment of SMEs, there is better organization of the resources, both financial and human, thus there is improvement in the productivity level and in the product quality.

2.2.11 Company's Culture

In a study conducted by Shihab, Wismiarisa and Sine (2011), a significant relationship between entrepreneurial orientation and organizational culture was revealed. In fact, culture has the ability to influence the firm's performance by improving commitment, loyalty and reducing bureaucratic costs thus increasing performance. It is argued that there are three main organizational culture types namely bureaucratic, innovative and supportive and innovativeness is being seen to be creative, enterprising, risk-taking and result-oriented. Therefore if setting the vision and missions of the organization and motivating the employees

to form part of the organizational culture, then the highly motivated employees will be dedicated to the accomplishment of the company's goals, thus the former are more adaptable to innovation and new working techniques.

2.2.12 Information and Knowledge

According to Smith (2005), innovation is something new that is it means creating something new though the processes of learning and knowledge. Therefore, if the employees are trained and are knowledgeable about the new working procedures, then they can easily implement their acquired knowledge and create new products, new processes and even improve their ways to market and advertise their commodities.

2.2.13 Route to Market through Government Preferential Procurement

Government of Mauritius is committed to promote innovation in the SME sector by increasing SME access to public procurement markets. The Government of Mauritius has reduced the supply side constraints in public contracting so that now, the SMEs benefit from Price Preference Margin during evaluation process and also, the bidding process and transaction costs have been simplified. Further, the Public Procurement Office in South Africa has conducted many out-reach awareness campaigns targeting 150 SMEs because as per findings of a study carried among governmental department and municipalities personnel (Baloyi ,2012), respondents agreed to the fact that through the provision of Government procurement services, the SMEs sector can benefit in terms of innovation and growth.

2.2.14 Facilitation of IPR Protection among SMEs

The Intellectual Property Rights (IPR) is a way to protect the ideas and creativity of the SMEs. Many SMEs wish to develop their own IP so that they can capture the market. This in turn will allow the SMEs to exert exclusive rights on their creation and consequently, new value added products can be produced thus fostering innovation within the SMEs. This fact is proved by Akiyama and Furukawa (2009) who stated an inverted U shaped relationship between IPR strength and innovation.

2.3 Barriers that impede SME innovation

Hadjimanolis (2003) claimed that there are factors that inhibit innovation and these barriers usually place inertia in innovation. Therefore, there is a need to identify their existence so that policy makers can create mechanisms to reduce their impact, or eliminate them or convert them into facilitators of innovation. These barriers to innovation can be categorised

into internal and external barriers (Piater, 1984; Hadjimanolis, 2003; Madrid- Guijarro, Garcia and Auken, 2009; Stanislawsky and Olczak, 2010) where internal barriers arise from the company's resources, capabilities and culture of the company and external barriers arise from its external environment. Also, it is argued that the barriers can be perceived and unperceived whereby barriers which have been identified by the firm are termed as being perceived, irrespective of it being an internal and external barrier, and unperceived barriers are those which have not been recognized by the firms.

2.3.1 Internal Barriers

Morrison (2006) argued that management decisions and the features of a company can affect the decisions regarding the growth of the firm.

2.3.1.1 Management Competence and Lack of Qualified Human Resource

Macpherson and Holt (2007) and Barratt-Pugh (2005) argued that a firm's growth is dependent on managerial knowledge and usually, the managers of the SMEs are less trained than that of the large enterprises, consequently, they opt for poor technology and have low incentive to innovate. They tend to ignore their employees who are better informed about the process and product (Tannock et al, 2001) and also due to a lack of communication between the supplier and the customer, there is a mismatch between the consumer's demand and the supply. This emphasizes the need to listen to the customers' requirements in order to understand their expected and perceived benefit of the product.

In a survey among 5 Portuguese SMEs, Barañano (2005) also revealed two main barriers to innovation, namely: lack of qualified human resources and a huge absence of external communication between knowledge generators.

Also, a CEO who lacks managerial skills and experience will seek for the next 'chicken with golden eggs' rather than develop a portfolio of opportunities.

2.3.1.2 Lack of Skilled Labour

It was argued that highly educated and skilled employees prefer to work for large enterprises that offer higher salary, job security and career possibilities rather than opt for SMEs. Therefore, the latter retain less educated and less trained labour who are not very conversant with new processes and this results in a slowdown in the workforce development which consequently has a negative impact on the quality of goods and services.

2.3.1.3 Poor Organizational Culture and Cognitive Barriers

A study conducted by the Economist Intelligence Unit (2007) revealed that the CEO's of full age is reluctant to extend the innovative capacity of the organization. Therefore, the organization will tend to follow the current line extensions rather than develop new business models and also many firms will prefer short term investment rather than long term investments.

Further, Janeiro (2009) revealed that a lack of planning and reluctance in setting the goals and taking advices, culture and strategy, resistance to change, poor labour management (Ligthelem and Storey, 1997), the tradition and cemented rules of the firm, the market leadership and the absence of rethinking, the additional work brought by change and the weak repay on risk assumption are cognitive barriers because they are not materially or technologically proven. However, they act as obstacles for the SMEs because they prevent the firm to react faster.

2.3.1.4 Use of Obsolescent Technology

Most SMEs are unable to innovate because they use obsolescent technology thus are not maximizing machinery utility. Also, due to lack of funding they cannot improve the use of technology, thus SMEs are mainly classified as users of technology and not as adaptors of technology (OSMEP, 2007a). Further, less knowledgeable and innovative managers may not find appropriate technology for their business and since, as per World Bank (2009), investments in technology are one of the viable ways to boost the existing capacity of the firms' and to improve the quality and productivity of production and to produce higher value added products, SMEs should be offered assistance in terms of technological development so that the former can compete and innovate.

2.3.2 External Barriers

Morrison (2006) proclaimed that businesses are affected by external macro-environments that they cannot control such as political, economic, social, technological, environmental and legal factors. These are not influenced by management decisions and are beyond the control of SMEs.

2.3.2.1 Lack of Government Support

Piater (1984) and Moktan (2007) argued that lack of government support acts as an important barrier to innovation. For instance, if the Government of Mauritius did not offer training and

development schemes, the SMEs in Mauritius would find it difficult to innovate because the SMEs usually concentrate on surviving in the market and reaping market share rather than aim on improving the firm's performance through innovation.

2.3.2.2 Access to Finance

Insufficient capital or lack of financial resources is the major obstacle for SMEs and usually the entrepreneur invest their personal capital to start their business and not be able to expand the operations since the internal financial resources are insufficient. It is also argued by Nichter and Goldmark (2009) that some policy favours large enterprises whereby small firms find it difficult to grow due to lack of access to finance. SMEs face insufficient collateral, high transaction costs and incapability to deal with the formal financial institutions (Harvie 2005; APO 2001; Leopairote, 1997).

Even Singh and Belwal (2007) revealed that due to the unavailability of financing, lengthy procedures, collateral requirement and high cost of raw materials and equipment's, the SMEs are reluctant to invest in R&D activities, innovation and technology (Hussain, 1998). Therefore, to sustain the Mauritian SMEs and help them to innovate, the Government of Mauritius plans to invest around 10 Billion MUR (Budget 2015-2016) and to undertake other training and business enhancement programmes.

2.3.2.3 Competition

SMEs are generally facing low competitiveness in terms of knowledge, innovation, prudent investment, business operation and good management which are positive factors required to elevate the quality level (OSMEP, 2007a). Developing countries face competition from other countries mainly due to globalization but restrictions generally favor developed countries (Lind, 2009 b). For the SMEs, most of them find difficulties in complying with the regulations set up by organizations such as World Trade Organization (WTO) and SMEs in Mauritius concentrate on producing crafts and textile products which are also produced by other developing countries like Seychelles, Madagascar, India and others. Therefore, SMEs in Mauritius produce low cost, low value added and labor-intensive products thus they cannot compete in terms of quality. Rather it is proposed that they should concentrate on increasing added value in order to enhance competitiveness (Lind, 2009a).

2.3.2.4 Corruption and Political instability

Hanvajanavong (E. Grimsholm and L.Poblete, 2010) state that some Thai firms perceive corruption as a cost and they prepare for it for their operation. It is viewed as an acceptable cost and it makes things go faster if you cannot reach the standard. However, as per Transparency International (2008), bribery may be more problematic since they feel powerless in the face of demands for bribes and are often unaware that bribery can be resisted. Therefore, due to perceived political and social instability in a country and dependence on a few pillars, the domestically oriented SMEs that produce crafts and artisanal products can find it difficult to find an investor therefore reducing their incentive to grow and innovate.

2.3.2.5 Lack of Information, Marketing and Sales Techniques

Usually, SMEs do not trade on the international markets as they lack information, marketing, sales and finance techniques and as per Siringoringo et al (2009), lack of market research and information can prevent SMEs to identify proper market networks and prosper in the long run (Hossain, 1998).

2.3.2.6 Government Policies and Lengthy Administrative Processes

Bari et al (2005) studied the SMEs in Pakistan and they developed a 'binding constraint' as a technique to target the problems affecting the growth and investment of the firm. Generally, the SMEs faced excessive government regulation, an exploitative tax administration system and a weak technological base thus preventing SMEs to grow and expand.

In Mauritius, many government policies (mentioned earlier) were proposed to provide assistance to SMEs; however, due to lack of effective administrative procedures, laws and access to assistance from governmental institutions (Harvie, 2005), SMEs find it difficult to operate efficiently and innovate.

2.3.2.7 Consumer Behaviour

Consumer behaviour pressures SMEs to innovate so that they can respond to changes in the demand. Hassan and Agus (2005) opine that demand changes due to globalization and this has a great impact on SMEs' performance. For instance, if the consumers demand for environmental friendly products, then small firms should adjust their business by incorporating innovative policies in their business strategies and operational activities to meet up the consumer demand (Cheah and Cheah, 2005).

2.3.2.8 High Costs associated with Innovation

Massa and Testa (2008:396) revealed that for an entrepreneur, innovation is ‘anything that makes money’ however, as per Keegan et al (1997), high costs are associated with innovation and this burden of costs usually falls on the small firms rather than on the large firms. Therefore, the SME finds it difficult to innovate as they primarily aim at survival and capturing market share rather than innovation.

2.3.2.9 Excessive perceived economic risk

In a study by Coras et al (2013), the risks associated with open innovation among Romanian SMEs have been studied and it has been outlined that risks can be in terms of insufficient financial resources, inexperienced, unmotivated and unwilling to cooperate people, poor adaption to technological advances, knowledge sharing risks, weak capital and noteworthy regulation risks. Therefore the SMEs should be able to overcome these risks so that they can innovate. By investing in knowledge and by building solid leadership and ethical behaviour, the SMEs will be able to cope with the risks that small firms encounter in external partnerships.

2.4 Empirical Review of Selected Cases

The empirical review related to the factors that hinder SME innovation has been outlined below:

2.4.1 A study among Iranian Manufacturing SMEs

Among a sample of 88 Iranian manufacturing SMEs, an in-depth study of the barriers of innovation has been analyzed. Eleven barriers of innovation, namely: government regulations, lack of information on market and technology, lack of qualified personnel, availability of finance, cost of finance, too high direct innovation costs, excessive perceived economic risk, international regulations and uncertain demand dominated by established enterprises were tested through distributing of questionnaire. This study shows that the most significant barrier is associated with costs whereas the least significant are associated with lack of information and the survey results show that the Iranian SMEs are not collaborating with universities and higher education institutions- they do not see university as a main source of information (Aminreza et al, 2011).

2.4.2 Innovation capacity of Portuguese industrial firms

Using a primary data collection approach, questionnaires were administered among 819 firms and out of them 470 carried technological innovation and 298 undertook product or process innovation. The barriers to innovation that were identified are high costs of innovation, lack of financing, lack of skilled personnel, high economic risk, organizational rigidities, government regulations, lack of customer's responsiveness and lack of technological and market information. However, the most important obstacles to innovation are revealed to be high costs of innovation, lack of financing and lack of skilled personnel whilst the least factors that hinder SME innovation are the lack of information on market.

2.4.3 Investigation of obstacles faced by Malaysian Manufacturing firms

The study conducted in Malaysia food processing industry in 2010 identified four important innovation barriers namely the economic risk, the cost barriers, the government and market barriers. With the help of a set of questionnaires which was mailed to 500 SME food processing companies, ICT and unskilled staff were also identified as barriers to innovation but they have a lower influence (Mohd and Syed, 2010).

2.4.4 Investigating the Role of Business Model Innovation in the Commercialization Strategies in SMEs- using a qualitative approach

This study was empirically done among the SMEs in Finland and Nigeria. A qualitative research method was used whereby the researcher planned to observe, describe and interpret settings as they are, maintaining what Patton (1990) calls an 'empathic neutrality'. It is an approach that does not seek to quantify data but rather it uses inductive analysis. This study attempted to observe and record analysis under research without bias via induction and deduction which will pave the way for what is true and, or what is false in the thesis. The results revealed the importance of business models innovation in the internalization exertion of the SMEs and this study even produced reliable results on the role of business model innovation in the commercialization strategies in SMEs (Adelakun, 2014).

2.4.5 Testing the importance of the factors that influence innovative firms in Spain

A sample of 3964 innovative firms were assessed and it was found that R&D intensity, costs, risks and other cooperation strategies influence the firms' decision to cooperate with research institutions in R&D. Also, to test the importance of these variables, a logit regression model

was run and it was found that even the firm's size and type of innovation affect the manufacturing and services.

2.4.6 Major Obstacles to innovation in Ethiopia

Lack of information support system, shortage of technical skills, relatively weak intellectual property rights protection system, absence of proper and effective standard setting and quality control mechanism and lack of appreciation by government authorities- these are the major barriers identified by the UNCTAD (2002:95-96) among the SMEs in Ethiopia.

2.4.7 Assessing the Role of SME Entrepreneurs Innovativeness and Personality in the Adoption of Innovations

Marcati, Guido and Peluso (2008), conducted a study among the SME entrepreneurs and it aimed to measure general innovativeness (GI) and specific innovativeness (SI). The consumer innovativeness was measured and their effects on the entrepreneur's intention to innovate were also assessed. A Five Factor model of human personality was used to test the entrepreneur's innovativeness to their basic personality traits. Finally, using the theory of planned behavior, the predictive power of GI and SI were compared. It was found that entrepreneurs' innovativeness and personality play a major role in innovation adoption among SMEs.

2.4.8 External Factors that affect Polish SMEs' to innovate

The results show that external factors such as regulations, access to external financing, bureaucracy of institutions, government financial support, the tax system, time necessary to comply with regulations, and crisis and instability are very important for SMEs. It was also found that lack of government support and weakness of tax incentives is an important barrier to the innovation process (Walicka, 2014).

2.4.9 Barriers to innovation in Indian SMEs

Pachouri & Sharma (2016) identified the main barriers to innovation in Indian SMEs to be: people and skills, Finance, Information, Government policies, infrastructure and market factors such as competition, protectionism among others.

Factors like government funding, technology, R&D, the Human Resource Management practices, the entrepreneur traits and company culture, the IPR protection and the Government Preferential Procurement can directly and indirectly promote innovation within

an SME. Conversely, the major barriers of innovation that were identified are lack of government support, lack of qualified Human resources, financial constraints, Government Regulation and lengthy administrative processes, high economic costs and risks and lack of information and sales techniques. Thus if the latter are overcome then these major obstacles can easily be converted into facilitators of innovation and SMEs will benefit in terms of innovation and an improvement in the firms' performance and profitability level.

2.5 Ten-year SME Master plan (2017)

The 10-year SME Master Plan was released in March 2017. The aim was to address the main constraints of SMEs and produce a comprehensive strategic plan that would bring about resilience and productivity to the sector.

Concerning innovation, the strategies proposed were inter alia to foster emergence of high technology and value Addition SMEs namely:

- enable SME to develop new products and take better advantage of IP rights
- public research to focus on National socio-economic priorities
- foster SMEs collaboration
- technology transfer from large corporates
- leverage Mauritius economic diplomacy networks

Other innovation oriented measures have also been proposed under other High Impact Initiatives.

3. METHODOLOGY

To identify the barriers and drivers of innovation among Mauritian SMEs, a mixed approach was adopted, which included both quantitative as well as qualitative methods. In this section, a detailed description of the methodologies, the sources of data, the sampling procedures and the statistical treatments to be undertaken, will be elaborated.

3.1 Description of Research Design and Procedures Used

There are two main ways to collect data namely through a census or a sample survey:

Census involves the collection of data from every member of a population. Even though under a census, everyone has the opportunity to participate, it is easy to administer and accuracy errors are reduced. However, Bannerjee & Chaudhury (2010) proposed the adoption of sample survey because a census is a time consuming.

A sample survey involves the use of responses from a cross section of a population and usually, random sampling or stratified sampling techniques can be used to derive the sampling frames.

For our study, a stratified sampling technique was used whereby 200 SMEs from 18 different sectors have been identified out of a population of 122,600 SMEs. The sampling approach was preferred to census because firstly, sample survey is cost effective, less time consuming and especially when the sample results are most likely to represent the views of the entire target population.

The sample survey was carried out using a structured questionnaire designed to collect data on a large number of variables from a representative sample of respondents. A Principal Component Analysis (PCA) was conducted on the data collected, which would bring out the important patterns and variation in the dataset. A binary logistic regression was then performed so as to identify the important barriers and promoters of innovation within SMEs. For the qualitative approach, face to face interview was adopted.

3.2 Sources of Data

3.2.1 Primary and Secondary Data Collection Techniques

There are two major data collection techniques namely primary and secondary:

Primary data are collected for a specific research problem at hand, using procedures that fit the research problem best and every time primary data are collected, new data are added to the existing store of social knowledge.

Conversely, secondary data refers to materials already created by other researchers, made available for reuse by the general research community.

In our study, the primary data collection approach was used whereby raw data was collected directly from SME entrepreneurs and stakeholders through questionnaires and interviews.

3.2.2 Research Methods

Two main research methods include the quantitative and qualitative methods:

Quantitative approach refers to studies where the data concerned can be analyzed in terms of numbers. Usually quantitative approaches draw up on positivist ontologies and are highly objective. Quantitative research can also be through experiments which seek to determine if a specific treatment influences an outcome and as per Keppel (1991), there can be true experiments with random assignments of subjects to treatment conditions and quasi-experiments with nonrandomized assignments.

On the other hand, qualitative approach is a subjective approach which aims to identify and interpret social interactions. Unlike the quantitative, this approach is not random and the objectives are to identify patterns, features and themes.

A mixed method research is one that combines both quantitative and qualitative methods into one study so as to have a broader perspective of the overall research problem. It involves the collection of quantitative and qualitative data either simultaneously or sequentially and the results include both statistical data analysis and observations in the same study.

Our study aims at identifying factors that influence SMEs innovation in the Mauritian context: The mixed approach is a most appropriate one since within the same study, we were able to collect primary data through a closed-ended questionnaire (quantitative strategy) whereas views, opinions and perceptions were recorded during face-to-face interviews (open-ended qualitative approach).

In the quantitative approach, the objectives are to describe and explain the factors/barriers influencing innovation, and following this, predictions can be made. Data collection is carried out through a population survey with the administration of a closed-ended questionnaire to a stratified sample.

After the data collection process, Principal Component Analysis (PCA) of the data identified the factors/barriers to innovation. Using the binary logistic regression, the relationship between willingness and ability to innovate will be described in respect to their respective explanatory variables and even, using the outcome, the intention for SMEs to innovate can be made.

Using the qualitative approach, a face to face interview was to be undertaken among a proposed sample of 12 out of which 3 would be public officials and the remaining would be SMEs entrepreneurs from diverse sectors in Mauritius. This would enable us to capture the views and opinions on the factors that influence SME innovation in Mauritius from both policymakers and policy adherers.

3.2.3 Sampling Procedure

The broad steps to conduct any sample survey are as follows:

3.2.3.1 Population sample

A population is usually a collection of all sampling units in a given region at a particular point in time or a particular period. Based on the objectives of our survey, the population sample is the total number of SMEs operating in Mauritius.

However, the total number of SMEs reported from different sources diverge. This is because the classification criteria for SMEs differ from institution to institution. For example, published data from Statistics Mauritius (November 2017) reported a total of 172,200 MSMEs in Mauritius and Rodrigues in year 2013, of which 19% were SMEs whereas in the Mauritius National Export Strategy report (2017-2021), a figure of 108,000 SMEs was reported based on the definition of annual financial turnover between 2 and 50 millions MUR. SMEDA reported 21,514 registered SMEs as at December 2016, of which 12,219 were operational and 1,268 were benefitting from SMEDA assistance on their current schemes.

Because of these inconsistencies, in our study, a targeted convenience sampling of 200 SMEs was adopted.

The SMEs in Mauritius are divided into 18 different sectors which include Textile, ICT/BPO, Financial, Hotels and Restaurants, Construction, Agriculture, Education, Health, Handicraft, Manufacturing, Real Estate, Renting, Social Work, Storage and Logistics, Wholesale and

Retail, Aquaculture, Services and Others such that diverse factors that influence SMEs innovation in the different sectors can be derived.

3.2.3.2 Sampling Frame

The sampling frame has to be clearly specified. A sampling frame is a complete list of all units of population to be surveyed and usually, all the sampling units have identification particulars. For the present study, our sample frame is the 1,268 registered SMEs benefitting from SMEDA assistance on their current schemes (2016). From this list, 200 SMEs from different sectors were randomly selected using stratified sampling technique.

3.2.3.3 Sampling methodology

After obtaining the list of SMEs, the next step is to draw up a sample design. The sample design is usually based on determination of sample size, allocating them to the selected sample and ways of grouping units on a frame (Statistics Canada, 2009). Under this approach, there are two groups to determine sample size namely the probability sampling and the non-probability (Hall, 2008). Under probability sampling, each element of the population has a known non-zero chance probability of selection. Probability sampling includes simple random sampling, systematic sampling, stratified, cluster random sampling, stratified cluster and complex multi-stage random. Under the non-probability approach, there is no random sampling and examples include convenience sampling, quota sampling, dimensional, purposive and snowball sampling techniques.

In our study, the stratified sampling technique which is a probability sampling method was adopted since the Mauritian SMEs population is divided into 18 different sectors (strata) in Mauritius.

3.2.3.4 Stratified Sampling

Stratified sampling is obtained by separating the population elements into non-overlapping and homogeneous groups, called strata, then selecting a simple random from within each stratum. Under stratified sampling, more precision are obtained compared to a simple random technique and here, the stratification factor is the 18 different sectors in Mauritius out of which our sample size will be derived using a proportionate allocation method. This method is also known as the EPSEM method where all the elements have equal chance of being selected.

Our sampling frame consisted of 1,268 SMEs as stated above and using the following formula for proportionate allocation, the sample size for each sector will be obtained:

$$n_h = (N_h/N) * n \quad \longleftarrow \text{Equation 1}$$

Where n_h = sample size for the h^{th} stratum, representing the number of SMEs in every sector.

N_h = the population size of the h^{th} stratum, representing total number of SMEs in every sector. (In our case, $N = 1\,268$).

n = Sample size ($n=200$)

3.2.3.5 Determination of Sample Size per sector

The first step involves the calculation of sample size from each sector. Since the strata are of unequal size, proportionate allocation using the formula in equation 3, was applied.

The following table illustrates the allocation process given the targeted sample size (n) is 200.

Stratum	Sectors	N_h	$n_h = (N_h/1268)*200$
1	Agriculture	33	0.5
2	Aquaculture	9	0.1
3	Construction	167	2.7
4	Education	21	3
5	Financial and Insurance activities	49	8
6	Human Health and Social Work	6	1
7	Other	21	3
8	Other Services	209	33
9	Manufacturing	197	31
10	Handicraft	92	15
11	Hotels and Restaurant	26	3
12	Renting	22	3
13	Transport	22	3
14	Textile	69	11
15	Wholesale	241	37
16	Real Estate	8	1
17	Information Communication and Technology (ICT)	94	15
18	Storage	2	1
TOTAL		1268	200

Table 3: Sample Stratification table

During the proportionate allocation, since the number of enterprises registered in the Storage sector was too small (only two entrepreneurs), no SME was to be targeted. However, we chose to include one entrepreneur to represent the Storage sector.

3.3 Methods and Instruments of Data Gathering

As mentioned earlier, both qualitative and quantitative approaches have been used to gather primary data.

3.3.1 Qualitative method- Face-to-face interview

Under this approach, semi-structured interview was conducted among public officials and SME entrepreneurs operating in different sectors and all the questions were in accordance with the objectives of the study. Two public officials namely the Senior Adviser on SME matters working at the Ministry of Business, Enterprise and Cooperative and the Managing Director of the SMEDA and four SME entrepreneurs operating in the transport, ICT, Hospitality and Food and Services sector respectively were interviewed and their views and opinions were recorded.

The foremost aim was to identify the factors that influence SME innovation in Mauritius as well as methods to mitigate the barriers of innovation should be proposed. In this context, the proposed questions were as follows (Annex 3):

a) What is your idea on innovation?

This question will provide us with the entrepreneur's understanding on the concept of 'innovation'. The different ways through which innovation can be practiced and the reasons behind these practices will also be captured.

b) What are the factors that can promote innovation?

The foremost factors that can encourage innovation should be identified and during this semi-structured interview, the interviewees may provide insights on the factors that they believe are important for sustaining innovation in SMEs. These beliefs were usually backed with concrete evidences.

c) Do you think altering the organizational structure of SMEs form part of innovation?

This question aims to analyze the perceptions of the interviewees on whether altering the business model is a way to innovate. The different ways through which SMEs can alter their business models as well as the benefits that they shall pertain were also recorded.

d) What are the barriers that you normally experience when attempting to innovate?

This question will identify the major barriers faced by SMEs when innovating.

e) How can we overcome these barriers to innovation?

Here, we attempt to record the views of SME entrepreneurs on the corrective measures that should be undertaken to overcome the earlier mentioned barriers to innovation. Their personal experiences will also be recorded.

f) According to you, what policies can be implemented to further promote innovation?

The interviewee will propose innovation incentives that need to be implemented by policy makers in the future so that innovation can be promoted within SMEs.

g) Have you seen any particular changes regarding innovation within SMEs in Mauritius during the past years?

The interviewee will be asked to describe the current and future trend of innovation with SMEs in Mauritius. This question eventually aims at evaluating the entrepreneur's knowledge of the domestic market.

3.3.2 Quantitative Approach

3.3.2.1 Questionnaire Adaptation

Under the quantitative approach, primary data were collected through the administration of questionnaires among the SME entrepreneurs. Note that SMEs registered by the Small and Medium Enterprise Development Authority (SMEDA) were targeted and the questionnaire for this research study was adapted from the Creativity, Innovation and Entrepreneurship Models.

The questionnaire (Annex 2) consists of 4 sections:

- SECTION A captures the respondents' demographic information such as gender, age group, residential area, highest academic qualification, number of years of experience operating as an entrepreneur, sector of operation, type of market, annual turnover and number of employees.

- SECTION B tests the entrepreneurs' perceptions on innovation practices and the ability and willingness to practice innovation within their firm is assessed. The frequency to which the entrepreneur will innovate is also being measured.
- SECTION C displays a list of enhancers of innovation and the respondents are asked to rate the extent to which they agree that the proposed enhancers of innovation are important to promote innovation. As per the Creativity and Entrepreneurship model and a combined conceptualized model proposed by Soini & Veseli (2011) and Bozkurt & Kalkan (2014), 17 promoters of innovation are listed.
- SECTION D lists 22 barriers to innovation adopted from the model proposed by Grimsholm & Poblete (2010) and using 5 Likert-scale, the respondents will rate these factors.

Note that to decipher the most important enhancers and promoters of innovation, a factor analysis was conducted and the factors with the highest score was chosen.

3.3.2.2 Pilot Testing

An important component in the data collection process is the pilot study which is 'a small scale trial run of all the procedures planned for use in the main study' (Monette et al, 2002, 9). The purpose of this small-scale pre-study is to assess the feasibility of some crucial components of the full-scale study: It permits preliminary testing of hypotheses, allows a thorough check of the planned analytical and statistical procedures and can help reduce the number of unanticipated problems.

For our pilot testing, 20 SME entrepreneurs representing 10% of our sample size were selected randomly. The questionnaire was emailed to the 20 entrepreneurs operating in the 18 different sectors but the response rate were only 35 per cent with only 7 responses were obtained.

To test the reliability of the Likert-scale, a Cronbach Alpha test should be undertaken and as per Kline (1993), a coefficient of 0.7 or more is acceptable for a sample size of 20 or more. However, since our response rate for the pilot study was low, the Cronbach alpha test could not be applied. Instead, we took this opportunity to alter the statements defining the enhancers and barriers to innovation so that they become more comprehensive and understandable to the SME entrepreneurs, which will increase our chances of obtaining more reliable and accurate data.

3.3.2.3 Results from Pilot Testing

The survey was conducted through Google forms and during the pilot test, a typological error was found in Question 12 (Annex 2) whereby the ratings (1-10) were wrongly labeled with ratings No 1 and 10 were both assigned as 'Less Likely' instead of rating 1 'Less likely' and rating 10 'Highly likely'. This error was pointed out by an SME entrepreneur operating in Hotels and Restaurant sector and it was immediately rectified.

The second difficulty faced by the respondents was Question 10 which was a Multiple Choice Question with 4 answers and which aimed to test the respondents' knowledge on the concept of 'innovation'. Here, an entrepreneur with more than 10 years of experience and operating in both local and international markets outlined that for him, all the 4 answers describes 'innovation' however, he was able to choose one answer which best describes 'innovation'. Therefore, this was one of the reasons why Question 10 was still included in the questionnaire but the foremost reason was, as per Frynas and Mellahi (2014), innovation was defined as the '*Commercialization of a new product or process*'. Therefore out of the 4 options, only one answer fully describes innovation thus no amendments were done to Question 10.

3.3.2.4 Problems faced during Pilot Testing

During the administration of questionnaire through e-mails, the main problem faced was that the filling up of the questionnaire was time consuming. In fact the questionnaire in a word format was mailed to the SME entrepreneurs and the latter had to download the form and fill it in using proper Microsoft Word tools like symbols in terms of ticks, or colour options and the second option was to print the form, fill it manually then scan and sent back the form to researcher. Therefore, since these processes were time consuming, the response rate was low.

3.3.2.5 Solutions to overcome the problems

Note that, to overcome these drawbacks, it was proposed to test the questionnaire among a panel of researchers/lecturers at the University of Mauritius. They reviewed the questionnaire and after their approval, the Google forms were then mailed to 200 SME entrepreneurs operating in 18 different sectors.

3.4 Data Collection Process

The data collection process was done in two phases namely by administering the questionnaire through emails and by administering the questionnaire individually to the SME entrepreneurs.

3.4.1 Phase One

As per the Stratified sampling in Table 3, 165 mails in terms of Google Forms were sent to SME entrepreneurs operating in 18 sectors and here, the response rate was 48 representing a percentage of 29 per cent. Before sending the mails, the selected entrepreneurs were contacted via telephone and were asked whether they voluntarily wished to participate in the survey. Following their approval, the Google Forms were then forwarded to them. The foremost aim behind this method of data collection was to firstly save time and travel costs. In addition, the entrepreneurs were contacted verbatim so that the former feel part of the research project and will be motivated to provide their feedbacks via the filling up of the Google forms.

3.4.2 Phase Two

In phase two, the questionnaire was administered directly to the individual entrepreneur at an SME fair held from 3rd to 6th November 2016 at the Caudan Waterfront. The expo fair was organized by the SMEDA and around 90 SME entrepreneurs from the Handicraft, Manufacturing, Agri-Business and Agriculture, Textile and Other services sectors participated. Our target group was these 90 SME entrepreneurs and the response rate was 92 per cent (83 duly filled questionnaires).

A total response rate of 131 (out of 200) with a percentage of 65 per cent was obtained. Data cleaning and validation processes were done before data analysis.

3.4.3 Data Cleaning Process and Data Input

It was noted that one Google form was wrongly filled in, thus it was eliminated and it was also noticed that one respondent missed Question 3; therefore using a random method, this missing figure was filled in. Therefore, after the data cleaning process, total response rate was 130 out of which the response rate through administration of Google forms dropped to 47.

3.5 Statistical analysis

All collected data was input and analyzed using statistical software SPSS Version 2.1. Factor analysis, binary logistic regression and multiple regression were applied to the data and descriptive statistics as well as statistical models were derived (Annex 1).

4. DATA ANALYSIS AND INTERPRETATION

4.1 Introduction

This section aims at presenting and analyzing the data collected.

Our data collection process was comprised of two parts:

- I. the quantitative study with the administration of a closed-ended questionnaire (Annex 2) to SME entrepreneurs.

We planned to include 200 SMEs representing the 18 different sectors in our survey. The questionnaire was sent through emails to 165 SME entrepreneurs ; however only 48 responded, representing 29% of response rate.

In an effort to achieve our target sample, the same questionnaire was proposed to 90 entrepreneurs who were participating at an expo fair reserved for SMEs from different sectors. 83 of them were willing to respond to our survey.

Finally, we were able to obtain data from 131 SME entrepreneurs, which represent 65.5% of response rate.

- II. the qualitative study involved face-to-face interview with stakeholders and policy makers (Annex 3).

We planned to interview 12 persons, out of which 3 public officials and 9 entrepreneurs from different sector activities.

We managed to interview 2 public officials, namely the Senior Advisor on SME matters at the Ministry of Cooperative and the Managing Director of the then SMEDA. 4 SME entrepreneurs from the ICT sector, Service sector, Transport sector and Hospitality & Food sector were also interviewed.

4.2 Data analysis of survey

A total of 131 SME entrepreneurs participated in our survey, of which 59 male and 72 female. Each of the 18 sectors was represented within the 131 respondents except for the Aquaculture & Ocean Economy sector (Figure 2).

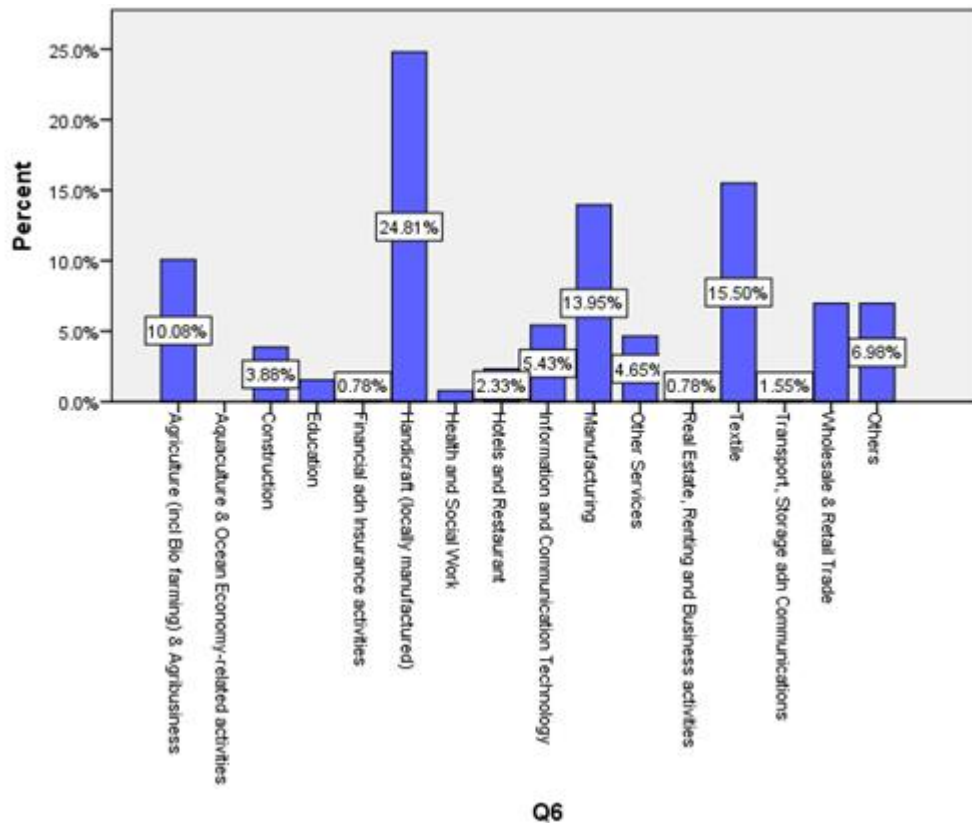


Figure 2: Percentage of SMEs representing each sector

4.2.1 Years of Experience versus markets in which the SMEs operate

In terms of experience that the SMEs have within the market(s) they operate, 44 out of 128 entrepreneurs have 10 or more years of experience in the local market and 13 entrepreneurs had 10 or more years of experience at the International level.

		The market			Total
		Local	International	Both	
Number of years of experience	Less than 1	7	0	2	9
	1-3	32	1	9	42
	4-6	13	0	3	16
	7-9	10	0	3	13
	10 or more	35	4	9	48
Total		97	5	26	128

Table 4: No of years of Experience versus the market in which the SMEs operate

4.2.2 Willingness to innovate

Analysis of data relating to willingness to innovate (Q11a) showed that the majority of entrepreneurs (97%) were willing to innovate (Figure 3).

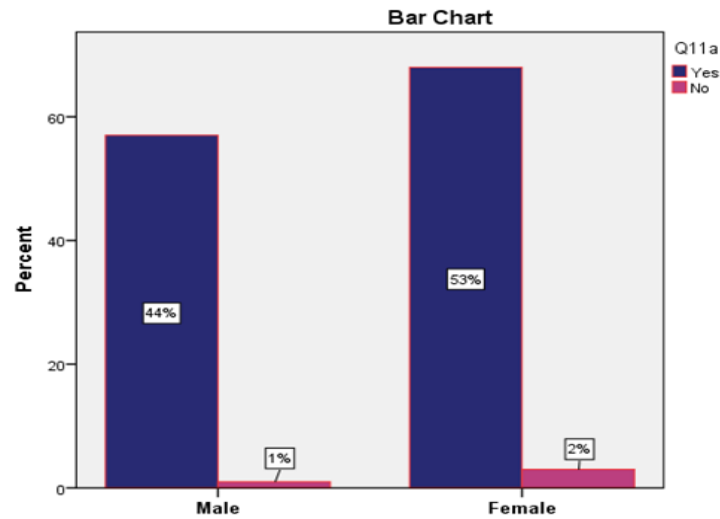


Figure 3: Bar chart showing percentage of respondents on willingness to innovate (according to gender)

4.2.3 Ability to innovate

As to the question on their ability to innovate (Q11b), 70% of the respondents stated that they were able to innovate (Figure 4).

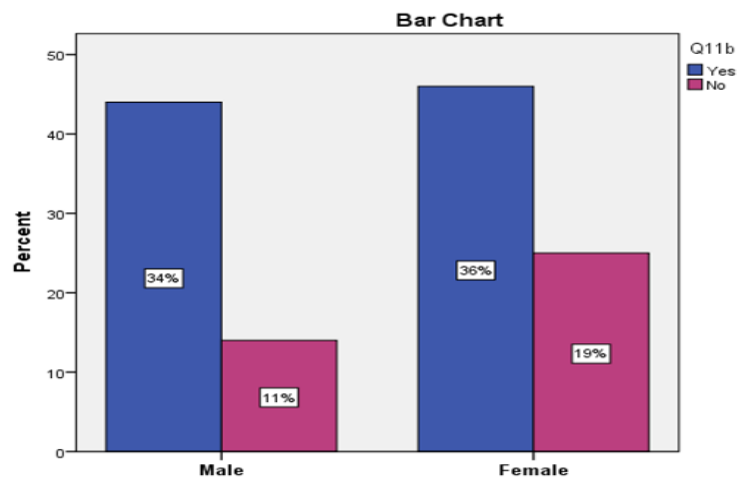


Figure 4: Bar chart showing the percentage of respondents who were able to innovate (according to gender)

4.2.4 Levels of Education versus perception on innovation

Question Q4 of the questionnaire was to evaluate the perception of respondents on innovation and to correlate it with their educational levels. 37% of the respondents were holders of a School Certificate (SC) or equivalent.

		Definition of Innovation				Total
		Commercialisation of a new product and/or process	Invention of a new product and/or service	New product and/or product concept	Implementation of a new production process	
Q4	CPE or below	5	6	6	7	24
	Vocational	1	1	0	1	3
	SC or equivalent	13	16	10	9	48
	HSC or equivalent	2	3	1	4	10
	Certificate/ Diploma	3	4	6	5	18
	Undergraduate	2	1	2	0	5
	Postgraduate	3	1	6	5	15
	Professional qualifications	2	1	2	1	6
Total		31	33	33	32	129

Table 5: Definition of innovation with respect to Level of Education

No marked demarcation was found in the perceptions on innovation in relation with education.

However, based on the nature of the definitions, the last definition (Implementation of a new production process) referred strictly to process innovation while the first three referred to product. Therefore, it can be inferred that the majority of respondents perceived innovation to be more product related than process related. This could inform further their perception on cost of innovation.

4.3 Factor analysis of survey data

Since our data contains many variables, we use factor analysis to reduced the number of variables. Factor analysis groups variables with similar characteristics together, thus producing a small number of factors from a large number of variables. The reduced factors are then used for further analysis.

4.3.1 Interpretation of Factor analysis of enhancers:

4.3.1.1 Descriptive statistics for enhancers

	N	Mean	Std. Deviation	Variance
Q14a	128	4.19	0.929	0.862
Q14b	128	4.20	0.899	0.809
Q14c	128	4.16	0.962	0.926
Q14d	127	4.13	1.000	1.000
Q14e	128	4.38	0.932	0.868
Q14f	128	4.08	0.893	0.797
Q14g	128	3.98	0.887	0.787
Q14h	127	3.68	1.083	1.173
Q14i	128	4.21	0.893	0.798
Q14j	128	3.88	1.127	1.270
Q14k	127	4.12	1.005	1.010
Q14l	127	4.20	1.008	1.016
Q14m	127	4.23	1.078	1.162
Q14n	127	4.24	0.921	0.849
Q14o	127	4.22	0.916	0.840
Q14p	126	3.97	1.109	1.231
Q14q	127	3.83	1.148	1.319
Valid N (listwise)	124			

Table 6: Descriptive statistics for enhancers

The first output from factor Analysis of enhancers is a table of descriptive statistics for all variables-enhancers (Table 7); the mean, standard deviation, variance and the number of respondents (N) are given. The standard deviations are high, i.e. the data is largely spread out from the mean and from one another. The variances and standard deviations range above 0.5 and no outliers can be observed in the mean; thus no anomalies can be found in the data.

From the descriptive statistics table, we can conclude that entrepreneur's ambition to flourish his business (Q14e), financial assistance from institutions (Q14m) and provision of fiscal incentives (Q14n) are the important factors for innovation within an SME because of their high mean values. Among those three variables, the most important enhancer for innovation is the ambition of the entrepreneur to flourish his business as it has the highest mean (4.38).

4.3.1.2 Correlation Matrix for enhancers

The next output from the analysis is the Correlation Matrix. The rule of thumb to carry out factor analysis is that all variables should be correlated.

Correlation measures the robustness of the relationship between two variables and measures the linear relationship between two variables. The value of the correlation coefficient, denoted as r , ranges from -1 to +1. If the correlation coefficient of two variables is zero, it signifies that there is no linear relationship between the variables. However, this is only for a linear relationship; it is possible that the variables have a strong curvilinear relationship. When the value of r is close to zero, generally between -0.1 and +0.1, the variables are said to have no linear relationship or a very weak linear relationship and when the value is closer to one, this indicates that there is a positive relationship between the two variables. (Steven Nickolas, 2017).

As per Table 9, all of the correlation coefficients are above zero and are positive indicating that the relationship between the variables with each other is linear and positive. For instance considering Q14a (long term vision) and Q14b (provision of training facilities), their correlation coefficients is given by 0.488 indicating that when the provision of training increase by one unit, this leads to an increase of 0.488 in the variable 'long term vision' – this also concludes a linear and positive relationship between Q14a (long term vision) and Q14b (provision of training facilities).

The correlation coefficient between a variable and itself is always 1, hence the principal diagonal of the correlation matrix contains 1s (green highlighted in Table 9) which means that when measuring the correlation between Q14a (long term vision) with itself, a perfect relationship can be found. Same applies to all other variables when regressing each of them on its own.

	Q14a	Q14b	Q14c	Q14d	Q14e	Q14f	Q14g	Q14h	Q14i	Q14j	Q14k	Q14l	Q14m	Q14n	Q14o	Q14p	Q14q
Q14a	1.000	.488	.508	.424	.570	.539	.497	.466	.496	.264	.433	.535	.549	.556	.563	.413	.371
Q14b	.488	1.000	.641	.625	.517	.441	.507	.521	.495	.241	.439	.435	.516	.515	.483	.480	.491
Q14c	.508	.641	1.000	.639	.501	.372	.411	.437	.534	.309	.522	.564	.554	.539	.572	.557	.398
Q14d	.424	.625	.639	1.000	.578	.556	.512	.470	.513	.350	.585	.480	.437	.536	.567	.459	.455
Q14e	.570	.517	.501	.578	1.000	.579	.655	.478	.423	.313	.534	.424	.409	.513	.563	.330	.336
Q14f	.539	.441	.372	.556	.579	1.000	.668	.353	.394	.416	.457	.439	.482	.564	.558	.435	.453
Q14g	.497	.507	.411	.512	.655	.668	1.000	.444	.501	.274	.411	.419	.467	.547	.549	.397	.412
Q14h	.466	.521	.437	.470	.478	.353	.444	1.000	.462	.215	.524	.393	.376	.411	.448	.482	.580
Q14i	.496	.495	.534	.513	.423	.394	.501	.462	1.000	.526	.565	.454	.412	.481	.535	.412	.360
Q14j	.264	.241	.309	.350	.313	.416	.274	.215	.526	1.000	.417	.375	.296	.332	.485	.293	.357
Q14k	.433	.439	.522	.585	.534	.457	.411	.524	.565	.417	1.000	.643	.532	.587	.592	.525	.403
Q14l	.535	.435	.564	.480	.424	.439	.419	.393	.454	.375	.643	1.000	.754	.736	.590	.615	.413
Q14m	.549	.516	.554	.437	.409	.482	.467	.376	.412	.296	.532	.754	1.000	.769	.648	.713	.468
Q14n	.556	.515	.539	.536	.513	.564	.547	.411	.481	.332	.587	.736	.769	1.000	.728	.675	.429
Q14o	.563	.483	.572	.567	.563	.558	.549	.448	.535	.485	.592	.590	.648	.728	1.000	.595	.444
Q14p	.413	.480	.557	.459	.330	.435	.397	.482	.412	.293	.525	.615	.713	.675	.595	1.000	.691
Q14q	.371	.491	.398	.455	.336	.453	.412	.580	.360	.357	.403	.413	.468	.429	.444	.691	1.000

Table 7: Correlation Matrix for enhancers

4.3.1.3 Kaiser Meyer Olkin (KMO) and Bartlett's Test for enhancers

KMO measures sampling adequacy ie. it determines whether the number of respondents are adequate or not. KMO returns values between 0 and 1 and it should be 0.5 or greater to proceed with factor analysis.

Kaiser recommendation for KMO values (1974):

- Above 0.9 - very good sampling
- Between 0.7 and 0.8 - acceptable
- 0.5 considered as minimum
- Less than 0.5 indicate the sampling is not adequate and that remedial action should be taken.
- Close to zero means that there are large partial correlations compared to the sum of correlations. In other words, there are widespread correlations and this is inappropriate for factor analysis.

From Table 9, we conclude that the sampling is more than adequate for factor analysis with a KMO value of 0.904.

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.904
Bartlett's Test of Sphericity	Approx. Chi-Square	1426.926
	Df	136
	Sig.	.000

Table 8: KMO and Barlett's test for enhancers

Barlett's test also measures the strength of the relationship among variables. The chi square value measures how well the observed distribution of data fits with the distribution that is expected if the variables are independent. From Table 10, we see that the high value of chi square satisfies this condition fully. The Barlett's Test of Sphericity is significant being approximately 0.000; significance being less than 0.05. Thus the null hypothesis is rejected, concluding that the sample size is adequate for factor analysis.

4.3.1.4 Communalities for enhancers

	Initial	Extraction
Q14a	1.000	.518
Q14b	1.000	.670
Q14c	1.000	.572
Q14d	1.000	.629
Q14e	1.000	.706
Q14f	1.000	.606
Q14g	1.000	.643
Q14h	1.000	.653
Q14i	1.000	.545
Q14j	1.000	.553
Q14k	1.000	.582
Q14l	1.000	.765
Q14m	1.000	.794
Q14n	1.000	.764
Q14o	1.000	.715
Q14p	1.000	.810
Q14q	1.000	.597

Table 9: Communalities for enhancers

The next item from the output is a table of communalities (Table 10) which shows how much of the variance (i.e. the communality value which should be more than 0.5 to be considered for further analysis) in the variables has been accounted for by the extracted factors.. For instance, 51.8% of the variance in Q14a is explained by Q14b, Q14c till Q14q and 67.0% of variance in Q14b is explained by Q14c, Q14d till Q14q and it goes on as the individual communality tells how well the model is working for the individual variables.

The total of the communality values is 11.122 such that the proportion of the total variation explained by the factors is $11.122/17=0.654$. This gives us the percentage of variation explained in our model and is an overall assessment of performance.

4.3.1.5 Total variance explained

In Table 11, the % of Variance column gives the ratio, expressed as a percentage, of the variance accounted for by each component to the total variance in all of the variables. The Cumulative % column gives the percentage of variance accounted for by the first n components.

Furthermore, eigenvalue actually reflects the number of extracted factors whose sum should be equal to number of items which are subjected to factor analysis and eigenvalues greater than 1 should be extracted.

The eigenvalue table has been divided into three sub-sections, i.e. Initial Eigen Values, Extracted Sums of Squared Loadings and Rotation of Sums of Squared Loadings.

For analysis and interpretation purpose we are only concerned with Extracted Sums of Squared Loadings. Here one should note that the first factor accounts for 52.248% of the variance, the second 7.141% and the third 6.042%. All the remaining factors are not significant. The first three principal components form the extracted solution and they explain nearly 65.43% of the variability in the original seventeen variables, so you can considerably reduce the complexity of the data set by using these 3 components, with only a 35% loss of information.

The Rotation Sums of Squared Loadings maintains the cumulative percentage of variation explained by the extracted components, but now this variation is spread more evenly over the components thus enabling an easier interpretation of the loadings obtained from rotated component matrix rather than those obtained from the unrotated matrix.

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	8.882	52.248	52.248	8.882	52.248	52.248	3.978	23.398	23.398
2	1.214	7.141	59.389	1.214	7.141	59.389	3.916	23.037	46.435
3	1.027	6.042	65.431	1.027	6.042	65.431	3.229	18.996	65.431
4	.975	5.736	71.166						
5	.854	5.026	76.193						
6	.648	3.813	80.005						
7	.593	3.486	83.491						
8	.469	2.758	86.250						
9	.401	2.359	88.609						
10	.362	2.129	90.738						
11	.335	1.971	92.708						
12	.278	1.633	94.342						
13	.253	1.491	95.832						
14	.217	1.278	97.110						
15	.190	1.120	98.230						
16	.154	.905	99.135						
17	.147	.865	100.000						

Table 10: Total variance for enhancers

4.3.1.6 Scree Plot for enhancers

The scree plot helps to determine the optimal number of factors (components) to retain. It is a plot of the eigenvalues against all the factors (Figure 5). The point of interest is where the curve starts to flatten. It can be seen that the curve starts to flatten between the third and fourth factors. As from the fourth factor onwards, the eigenvalue is less than 1, so only three components are retained. (Chetty P & Datt S, 2015).

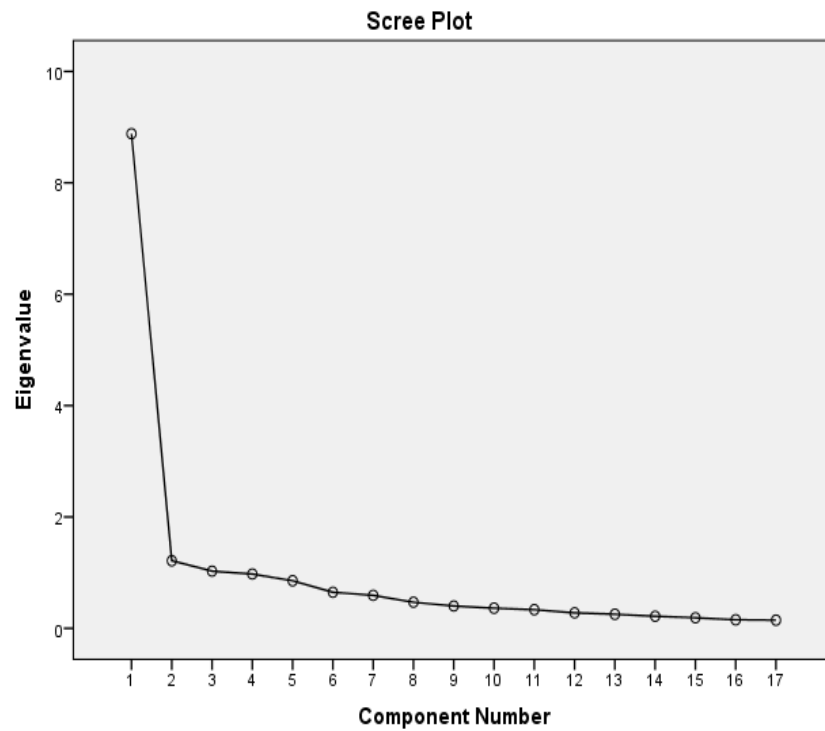


Figure 5: Scree Plot of eigenvalues of each component

4.3.1.7 Rotated Component Matrix for enhancers

	Component		
	1	2	3
Q14a	.339	.508	.382
Q14b		.320	.707
Q14c	.456	.350	.491
Q14d		.528	.536
Q14e		.693	.467
Q14f		.677	.302
Q14g		.644	.460
Q14h			.750
Q14i	.301	.620	
Q14j	.323	.654	
Q14k	.511	.493	
Q14l	.789	.341	
Q14m	.816		
Q14n	.723	.421	
Q14o	.570	.577	
Q14p	.780		.444
Q14q	.443		.627

Table 11: Rotated Component Matrix^a

	Component		
	Financial	Personality	Others
Q14a			
Q14b			.707
Q14c			.491
Q14d			.536
Q14e		.693	
Q14f		.677	
Q14g		.644	
Q14h			
Q14i			
Q14j			
Q14k	.511		
Q14l	.789		
Q14m	.816		
Q14n	.723		
Q14o			
Q14p			
Q14q			

Table 12: Rotated Component Matrix - Modified

The Rotated Component Matrix helps to determine what the components represent. It contains estimates of the correlations between each of the variables and the estimated components. From the above, the first table of 'Rotated Component Matrix' shows that Q14b (Provision of training facilities to workforce), Q14c (Acquisition of new machinery and equipment) and Q14d (Acquisition of adequate knowledge on other firms and the market) have substantially been loaded on FACTOR 1 (component 1)

Note that these three variables are linked (Training facilities to workforce means acquiring essential know-how to deal with new machines and even involves broadening the entrepreneurs' mind concerning trade on the international and local market). However, these have not been empirically backed with proper literature. It is thus preferable to consider the variables individually and not as a possible construct.

On the other hand, Q14e (Ambition of entrepreneur), Q14f (Tolerance of new ideas and new ways of doing things) and Q14g (An increased ability to forecast future scenarios) have been loaded on FACTOR 2 which can be conceptualized as 'Entrepreneur Personality'.

Finally, Q14k (Provision of innovation incentives), Q14l (Setting up of Grant Schemes), Q14m (Financial assistance from institutions such as SMEDA, MauBank) and Q14n (Provision of fiscal incentives) have been loaded on FACTOR 3 which can be conceptualized as 'Financial Assistance Aspect'.

All other remaining variables (those in purple) has been eliminated because for loading a factor, a minimum of three variables with a coefficient of preferably more than 0.5 should be retained. Since this condition was not satisfied, the remaining variables were ignored.

4.3.1.8 Reliability test for enhancers

PERSONALITY

Cronbach's Alpha	N of Items
.838	3

Table 13: Cronbach's alpha reliability test for Factor Personality

Cronbach's alpha is a measure used to assess the reliability, or internal consistency, of a set of scale or test items. In other words, Cronbach's alpha tests to see if multiple-question Likert scale surveys are reliable. In general, a score of more than 0.7 is usually preferred.

For the Factor 2 which is 'Entrepreneur Personality', the Cronbach's alpha is 0.838 which is above 0.7. We can thus conclude that this factor is reliable and is characterized as one of the enhancers of innovation within an SME.

FINANCIAL

Cronbach's Alpha	No of Items
.889	4

Table 14: Cronbach's alpha reliability test for Factor Financial

For the Factor 3 named as 'Financial Assistance Aspect', the Cronbach alpha is 0.889 which is considerable high. Therefore, it can be concluded that this factor is reliable and is characterized as one of the enhancers of innovation within an SME.

4.3.2 Regression Analysis on promoters of innovation

Entrepreneur Personality Traits and Financial Assistance have been found to be the most important promoters of innovation within an SME but to know which one is the most important factor among these two, a multiple regression analysis was run where Q12 (Rate your intention to innovate, on a scale of 1 to 10) was the continuous dependent variable and Entrepreneur Personality Traits will be the independent variables (Tables 17 & 18).

4.3.2.1 Regressing 'Intention to innovate' on 'entrepreneur personality traits'

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.202 ^a	.041	.017	2.486

a. Predictors: (Constant), Q14g, Q14e, Q14f

Table 15: Regressing 'Intention to innovate' on 'Entrepreneur personality traits'

From the table, it can be concluded that the regression yields an R squared value of 41 % which means that entrepreneur personality traits explains only 41% of variation in the entrepreneur's intention to innovate.

4.3.2.2 Regressing 'Intention to innovate' on both 'entrepreneur personality traits' and 'financial assistance'

The next step involves including the second factor in the regression equation to see whether 'financial assistance' has an impact on the intention to innovate.

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	0.208 ^a	0.043	0.013	2.484

a. Predictors: (Constant), Q14n, Q14e, Q14k, Q14f, Q14g, Q14m, Q14l

Table 16: Multiple regression of Intention to innovate to both 'Entrepreneur Personality Traits' and 'Financial Assistance'

From table 17, it can be concluded that the multiple regression with 'Entrepreneur Personality Traits and Financial Assistance as independent variables yield a R squared value of 43% which means that these two factors altogether explain 43% of variation showing an increase of approximately 2% in the level of variability.

Therefore entrepreneur personality traits can be considered as the most important enhancer followed by 'Financial Assistance'.

4.3.3 Predicting willingness and ability to innovate through group membership

4.3.3.1 Willingness to innovate

		Variables in the Equation					
		B	S.E.	Wald	df	Sig.	Exp (B)
Step 1 ^a	Personality	-.297	.307	.938	1	.333	.743
	Financial	.008	.216	.001	1	.970	1.008
	Constant	-.454	1.688	.072	1	.788	.635

^a Variable(s) entered on step 1: personality, financial

Table 17: Willingness to innovate

The Exp(B) column in the table presents the extent to which raising the corresponding measure by one unit influences the odds ratio. Exp(B) is also interpreted as the change in odds.

If the value exceeds 1, then the odds of an outcome occurring increase. If the figure is less than 1, any increase in the predictor (i.e. willingness to innovate) leads to a drop in the odds of the outcome occurring.

For example, the Exp(B) value associated with entrepreneur personality traits and financial assistance aspect is 0.743 and 1.008 respectively. Hence when entrepreneur personality traits and financial assistance aspect is raised by one unit (one person) the odds ratio is 7 and 10 times as large respectively. Therefore if an entrepreneur is ambitious, then he is 7 times more willing to innovate his small and medium business and if he has benefited from financial assistance and grants from relevant authorities then there is 10 times more chance for him to opt for innovation.

4.3.3.2 Ability to innovate

Variables in the Equation							
		B	S.E.	Wald	df	Sig.	Exp(B)
Step 1^a	Personality	-.346	.122	8.020	1	.005	.708
	Financial	.212	.087	5.962	1	.015	1.236
	Constant	-.153	1.112	.019	1	.890	.858

^a Variable(s) entered on step 1: personality, financial

Table 18: Ability to innovate

The Exp(B) value associated with entrepreneur personality traits and financial assistance aspect is now 0.708 and 1.236 respectively. Hence when entrepreneur personality traits and financial assistance aspect is raised by one unit (one person), the odds ratio is 7 and 12 times as large respectively. Therefore if an entrepreneur is ambitious then he is 7 more times able to innovate his small and medium businesses and if he has benefited from financial assistance and grants from relevant authorities then there is 12 times more chance for him to be able to innovate.

4.3.4 Factor analysis of BARRIERS

4.3.4.1 Descriptive statistics for barriers to innovation

	N	Mean	Std Deviation	Variance
Q15a	124	3.84	1.185	1.405
Q15b	126	2.75	1.205	1.451
Q15c	126	3.32	1.171	1.370
Q15d	124	3.49	1.048	1.097
Q15e	126	3.39	1.138	1.296
Q15f	127	3.61	1.148	1.318
Q15g	125	3.70	0.976	0.952
Q15h	125	3.58	1.145	1.311
Q15i	125	3.59	1.086	1.179
Q15j	124	3.52	1.165	1.357
Q15k	126	3.52	1.010	1.020
Q15l	125	3.62	1.119	1.253
Q15m	126	3.81	1.129	1.275
Q15n	126	3.86	1.041	1.083
Q15o	125	3.57	0.919	0.844
Q15p	126	3.09	1.278	1.632
Q15q	125	3.62	1.038	1.077
Q15r	125	3.69	1.058	1.120
Q15s	126	3.90	0.978	0.957
Q15t	126	3.82	1.091	1.190
Q15u	125	4.02	0.880	0.774
Q15v	126	3.86	1.025	1.051
Valid N (listwise)	114			

Table 19: Descriptive statistics of barriers

From the descriptive table 20, it can be concluded that Q15u (lack of investment to improve internal creative ideas) has the highest mean implying that it is the most important barrier to innovation within Mauritian SMEs. There were also factors such as lack of awareness of competitors' strategies, the market and policy makers' moves, long payback period and economic crises that can hinder the expansion of the Small and Medium Enterprises.

Assessing the factors influencing SME innovation in Mauritius

		Q15a	Q15b	Q15c	Q15d	Q15e	Q15f	Q15g	Q15h	Q15i	Q15j	Q15k	Q15l	Q15m	Q15n	Q15o	Q15p	Q15q	Q15r	Q15s	Q15t	Q15u	Q15v
Correlation Matrix	Q15a	1.000	.136	.200	.325	.244	.451	.431	.280	.292	.317	.396	.345	.224	.133	.176	.010	.315	.273	.206	.190	.448	.213
	Q15b	.136	1.000	.261	.234	.175	.122	.220	.182	.238	.261	.322	.306	.283	.182	.118	.258	.112	.172	.246	.136	.164	.243
	Q15c	.200	.261	1.000	.456	.274	.181	.354	.238	.150	.238	.279	.320	.131	.156	.207	.353	.316	.255	.265	.101	.159	.192
	Q15d	.325	.234	.456	1.000	.481	.332	.413	.375	.353	.454	.466	.500	.297	.055	.184	.294	.311	.202	.193	.062	.081	.229
	Q15e	.244	.175	.274	.481	1.000	.385	.364	.430	.446	.443	.492	.486	.263	.149	.190	.224	.268	.088	.069	.096	.074	.247
	Q15f	.451	.122	.181	.332	.385	1.000	.587	.504	.533	.372	.391	.533	.246	.296	.202	.111	.332	.361	.362	.082	.291	.093
	Q15g	.431	.220	.354	.413	.364	.587	1.000	.526	.551	.448	.440	.580	.174	.138	.156	.160	.420	.313	.325	.145	.324	.092
	Q15h	.280	.182	.238	.375	.430	.504	.526	1.000	.649	.619	.526	.685	.235	.319	.187	.254	.377	.249	.141	.212	.285	.185
	Q15i	.292	.238	.150	.353	.446	.533	.551	.649	1.000	.685	.576	.588	.325	.204	.104	.177	.415	.293	.254	.215	.251	.315
	Q15j	.317	.261	.238	.454	.443	.372	.448	.619	.685	1.000	.740	.563	.264	.259	.185	.288	.425	.240	.184	.239	.352	.474
	Q15k	.396	.322	.279	.466	.492	.391	.440	.526	.576	.740	1.000	.537	.360	.284	.266	.324	.449	.319	.343	.326	.353	.481
	Q15l	.345	.306	.320	.500	.486	.533	.580	.685	.588	.563	.537	1.000	.425	.276	.109	.234	.353	.317	.319	.328	.277	.254
	Q15m	.224	.283	.131	.297	.263	.246	.174	.235	.325	.264	.360	.425	1.000	.358	.245	.250	.280	.402	.426	.355	.223	.425
	Q15n	.133	.182	.156	.055	.149	.296	.138	.319	.204	.259	.284	.276	.358	1.000	.209	.190	.140	.250	.342	.245	.187	.363
	Q15o	.176	.118	.207	.184	.190	.202	.156	.187	.104	.185	.266	.109	.245	.209	1.000	.208	.233	.119	.211	.190	.215	.326
	Q15p	.010	.258	.353	.294	.224	.111	.160	.254	.177	.288	.324	.234	.250	.190	.208	1.000	.376	.395	.232	.224	.178	.443
	Q15q	.315	.112	.316	.311	.268	.332	.420	.377	.415	.425	.449	.353	.280	.140	.233	.376	1.000	.519	.376	.171	.368	.468
	Q15r	.273	.172	.255	.202	.088	.361	.313	.249	.293	.240	.319	.317	.402	.250	.119	.395	.519	1.000	.629	.299	.387	.291
	Q15s	.206	.246	.265	.193	.069	.362	.325	.141	.254	.184	.343	.319	.426	.342	.211	.232	.376	.629	1.000	.352	.359	.283
	Q15t	.190	.136	.101	.062	.096	.082	.145	.212	.215	.239	.326	.328	.355	.245	.190	.224	.171	.299	.352	1.000	.491	.341
	Q15u	.448	.164	.159	.081	.074	.291	.324	.285	.251	.352	.353	.277	.223	.187	.215	.178	.368	.387	.359	.491	1.000	.368
	Q15v	.213	.243	.192	.229	.247	.093	.092	.185	.315	.474	.481	.254	.425	.363	.326	.443	.468	.291	.283	.341	.368	1.000

Table 20: Correlation matrix for barriers

4.3.4.2 Correlation Matrix for barriers to innovation

As per Table 21, all of the correlation coefficients are above zero and are positive indicating that the relationship between the variables with each other is linear and positive. For instance considering Q15c (the intensification of competition level) and Q15d (unwillingness to create value in new markets), their correlation coefficients is given by 0.456 indicating that when the competition level intensifies by one unit this leads to an increase of 0.456 in ‘unwillingness to create value in the market’.– this also concludes a linear and positive relationship between these two variables.

4.3.4.3 KMO & BARLETT for barriers to innovation

KMO and Bartlett's Test

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		0.858
Bartlett's Test of Sphericity	Approx. Chi-Square	1197.332
	df	231
	P value	0.000

From our table, we conclude a KMO value of 0.858 which proves that the sampling is good enough to undertake factor analysis. Also, the chi square value is high, that is 1197.332 which proves to be a good ‘goodness of fit’. Also, the p value is given by approximately 0.000 which is less than the 5 % level of significance thus concluding that the sampling is reliable and adequate.

4.3.4. 4 Communalities for Barriers

	Initial	Extraction
Q15a	1.000	.665
Q15b	1.000	.358
Q15c	1.000	.644
Q15d	1.000	.653
Q15e	1.000	.580
Q15f	1.000	.697
Q15g	1.000	.703
Q15h	1.000	.685
Q15i	1.000	.752
Q15j	1.000	.790
Q15k	1.000	.697
Q15l	1.000	.720
Q15m	1.000	.586
Q15n	1.000	.566
Q15o	1.000	.611
Q15p	1.000	.666
Q15q	1.000	.677
Q15r	1.000	.782
Q15s	1.000	.737
Q15t	1.000	.519
Q15u	1.000	.707
Q15v	1.000	.744
Valid N (listwise)	114	

Table 21: Extraction method - Principal component analysis of Barriers

Next is a table of communalities which shows that 66.5% of variability in Question 15(a) (unstructured business management practices) is explained by question 15(b), 15(c) till question 15(v) and 35.8% of variability in Question 15(b) is explained by question 15(c), 15(d) till question 15(v) and it goes on as the individual communalities tell how well the model is working for the individual variables.

Also, the total communalities is given by 14.539 (Total) therefore the proportion of the total variation explained by the factors is $14.539/22=0.661$. This gives us the percentage of variation explained in our model and is an overall assessment of performance.

4.3.4.5 Total Variance for barriers

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	7.530	34.227	34.227	7.530	34.227	34.227	4.620	20.999	20.999
2	2.077	9.442	43.668	2.077	9.442	43.668	2.206	10.028	31.027
3	1.490	6.771	50.440	1.490	6.771	50.440	2.054	9.337	40.364
4	1.302	5.918	56.358	1.302	5.918	56.358	1.999	9.086	49.450
5	1.122	5.100	61.458	1.122	5.100	61.458	1.920	8.729	58.179
6	1.018	4.627	66.085	1.018	4.627	66.085	1.739	7.906	66.085
7	.955	4.342	70.427						
8	.829	3.770	74.197						
9	.780	3.545	77.742						
10	.686	3.117	80.859						
11	.581	2.640	83.499						
12	.522	2.373	85.872						
13	.491	2.231	88.103						
14	.401	1.821	89.924						
15	.377	1.712	91.636						
16	.359	1.633	93.269						
17	.322	1.463	94.732						
18	.294	1.338	96.070						
19	.272	1.234	97.305						
20	.246	1.117	98.422						
21	.189	.858	99.280						
22	.158	.720	100.000						

Table 22: Total variance explained for barriers

Since Eigen values should always be greater than one, from the above table, six variables will be retained and all the remaining factors are not significant. The first six principal components form the extracted solution and they explain nearly 66.085% of the variability in the original 22 variables, with only a 34% loss of information.

4.3.4.6 Scree Plot for barriers

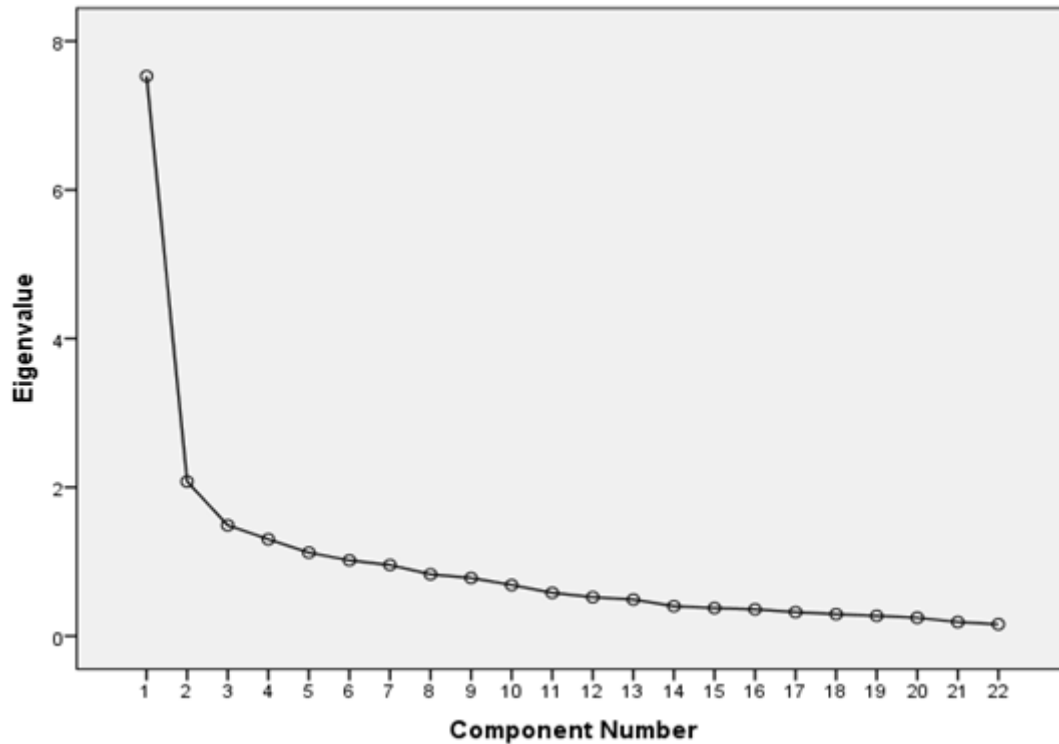


Figure 6: Scree plot for barriers to innovation

Figure 6 shows the Scree plot for barriers to innovation and it can be seen that the curve begins to flatten between factors 6 and 7. Thus only the six variables are used. The remaining variables have an Eigen value which is less than one and thus are not being considered.

4.3.4.7 Rotated Component Matrix for barriers

	Component					
	1	2	3	4	5	6
Q15a	.344					.703
Q15b			.444		.334	
Q15c					.744	
Q15d	.450				.659	
Q15e	.584				.399	
Q15f	.607	.308		-.302		.306
Q15g	.641	.345				
Q15h	.802					
Q15i	.830					
Q15j	.753			.441		
Q15k	.628			.409		
Q15l	.742		.308			
Q15m			.676			
Q15n			.719			
Q15o			.304		.342	.573
Q15p		.305		.588	.413	
Q15q	.345	.513		.436		
Q15r		.819				
Q15s		.695	.456			
Q15t			.400	.368		.322
Q15u		.390		.312		.619
Q15v			.322	.748		

Extraction Method: Principal Component Analysis

Rotation Method: Varimax with Kaiser Normalisation

^a Rotation converged in 15 iterations

Table 23: Rotated component matrix for barriers

HERE WE HAD TO ELIMINATE THE REMAINING FACTORS AS THEY WERE NOT SATISFYING THE RULE (THERE SHOULD BE THREE VARIABLES FOR EACH FACTOR)

4.3.4.8 Rotated Component Matrix for barriers - Modified

Component						
	COLLABORATION	UNDEFINED	UNDEFINED	UNDEFINED	UNDEFINED	UNDEFINED
Q15a						
Q15b						
Q15c						
Q15d						
Q15e	.584					
Q15f	.607					
Q15g	.641					
Q15h	.802					
Q15i	.830					
Q15j	.753					
Q15k	.628					
Q15l	.742					
Q15m						
Q15n						
Q15o						
Q15p						
Q15q		.513				
Q15r		.819				
Q15s		.695				
Q15t						
Q15u						
Q15v						

Extraction Method: Principal Component Analysis

Rotation Method: Varimax with Kaiser Normalisation

^a Rotation converged in 15 iterations

Table 24: Modified Rotated Component matrix for barriers

From the above, the first table of 'Rotated Component Matrix' shows that Q15e (Operation in mass competitive market), Q15f(low revenue) and Q15g (inability to spread costs and risks among other suppliers) has been loaded on FACTOR 1.

Next, Q15h (inability to satisfy the market demand), Q15i (lack of knowledge-sharing among colleagues), and Q15j (lack of collaboration with other local small forms) have been loaded on FACTOR 2 which can be conceptualized as 'Collaboration Aspect'.

Q15k (Reluctance of franchising of products/services) and Q15l (Inability to relocate the product/services in new markets) can be categorised as FACTOR 3 under the construct ‘business Models’.

Finally, Q15q (Unhealthy working relationship with suppliers and customers during R&D), Q15r (lower level of sales) and Q15s (lower payback period) have been loaded on FACTOR 4.

All the other variables are ignored since no constructs were found therefore only two factors will be retained namely ‘Collaboration Aspect’ and the ‘Business Models’.

4.3.4.9 Testing reliability of the factors/barriers

COLLABORATION:

Reliability Statistics

Cronbach's Alpha	No of Items
.849	3

The Cronbach alpha is 0.849 which is considerable high. It can be concluded that this factor is reliable and characterized as one of the barriers of innovation within an SME.

BUSINESS MODELS:

Reliability Statistics

Cronbach's Alpha	No of Items
.696	2

The Cronbach alpha is 0.696 which acceptable according to Tavakol M & Dennick R (2011).

4.3.5 Regression Analysis for Barriers

4.3.5.1 Regressing 'Intention to innovate' on 'Collaboration Aspect'

Model Summary				
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.259 ^a	.067	.043	2.382

a. Predictors: (Constant), Q15i, Q15g, Q15h

Table 25: Regression 'Intention to innovate' with 'collaboration aspect'

From Table 27, it can be concluded that the regression yields a R squared value of 67 % which means that 'Collaboration Aspect' as an independent variable and 'Intention to innovate' as dependent variable, explains 67% of variation. The standard deviation is large, showing the large dispersion of the data from the average.

The next step involves including the second factor in the regression equation to see whether 'Business Models' has an impact on the intention to innovate.

4.3.5.2 Regressing 'Intention to innovate' on both 'Collaboration' and 'Business Models'

Model Summary				
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.293 ^a	.086	.047	2.381

a. Predictors: (Constant), Q15l, Q15k, Q15g, Q15i, Q15h

Table 26: Regression 'intention to innovate' with collaboration and business models

From the table, it can be concluded that 'Collaboration Aspect' and 'Business Models' yields a R squared value of 86 % which means that these two factors altogether explains 86% of variation showing an increase of approximately 19% in the level of variability.

Therefore, it can be concluded that 'Business Models' has the most important role to play as a barrier to innovation followed by the 'Collaboration aspect' which can also hinder innovation within SMEs.

4.4 Analysis of data from interviews

QUESTIONS/ RESPONDENT	Senior Advisor on SME matters Min of Cooperative	Managing Director SMEDA	Representative of the ICT Sector	Representative of the Service Sector	Representative of Transport Sector	Representative of Hospitality & Food Sector	Analysis
1. What is your idea on innovation?	Technology is not innovation - Innovation is a macro structure- Can being in innovation through provision of training facilities (Recently signed a partnership with Microsoft and ACCA)-financial literacy	doing things differently- change in production techniques, way of thinking.	Is broad but it is mainly in terms of changing the Business models (geographical aspects)	Find smarter ways to make people's life easier (Add value), Bring change to our environment, Face competition	New ideas, New product	New products , Adopt new procedures, employ more labour	Product process Little focus on technology
<i>Probe: What are the ways you can undertake innovation? Why should you innovate?</i>	Create incubators for startups- help the SME to survive. Create various departments like HR, accounting, marketing which form part of the business.	Change in packaging- Make it more attractive	Keep in touch with customers and monitor the progress, Use new techniques/way of thinking, Add value to your products/services	Why?- Create value in the market and guarantees the success of the company.	Got new contracts - Improve in quality and service being provided, Creation of employment	Improve services, Improve quality services, be ambitious	Focus on products/ services
2. What are the factors that can promote innovation?	Competition, Change in mindset, Encourage collaboration with SADC and COMESA, Create an environment with all the promoters of innovation - An ecosystem, Create a platform where technology is made available to the SMEs.	Financial assistance , market demand, Be ambitious , Business Model (Organisation Structure)	Ambitious/ Brave entrepreneur	Develop critical and logical thinking, Good mean of transport/internet connection- Get the basic right first, Do think differently	Financial assistance (Subsidies and Low interest Rate from MAUBANK), High Returns (Sales), Ambition of the entrepreneur (NOTE: Competition is NOT a factor that encourage innovation)	Financial assistance , More equipment, More resources in terms of labour	1) Financial Assistance 2) Be ambitious
<i>Probe: Can you justify and support your answer?</i>							

QUESTIONS/ RESPONDENT	Senior Advisor on SME matters Min of Cooperative	Managing Director SMEDA	Representative of the ICT Sector	Representative of the Service Sector	Representative of Transport Sector	Representative of Hospitality & Food Sector	Analysis
3. Do you think altering the organisational structure of SMEs form part of innovation?	Yes	Yes	Yes	Yes	Yes		Positive on changing the organizational structure
<i>Probe: Can you propose ways through which you can alter your organisational structure? What are the advantages that it generates?</i>	Much better service is offered when we alter the organizational structure.	Have a structured account keeping technique- This will allow a better control over the personal expenses and business expenditures	To alter the BM means it is more flexible,	Develop a team, Collaboration bring more ideas (through right personnel). Advantages: Keeping pace with competition - accelerate working procedures (Flexible).	Increase the number of customers by improving the transport facilities (move from region to another) – This shall create incentive to work harder(Motivation).	when increasing the number of personnel, better services will be provided. More rapid service	
4. What are the barriers that you normally experience when attempting to innovate?	We lag behind in technology, The Mindset need to be changed.	Access to information and Knowledge, Ambition (the entrepreneur should be motivated to opt for innovation), Research and Expertise	Lack of knowledge/information/data about the market, Copy Right Issues (Patents), Business Models, Laws and Government ,Lack of assistance from SMEDA, Lack of expertise and training in the ICT sector	Mindset - Reluctant to adopt innovation, Lack of logical thinking	Finance- Most important barrier	Financial barriers, Lack of information/ knowledge on entrepreneurship	1) Lack of knowledge/ Lack of expertise/technology, 2) Financial Barriers, 3) Mindset
<i>Probe: Which of the earlier mentioned factors can be categorised as the few most major barriers to innovation, according to you?</i>							

QUESTIONS/ RESPONDENT	Senior Advisor on SME matters Min of Cooperative	Managing Director SMEDA	Representative of the ICT Sector	Representative of the Service Sector	Representative of Transport Sector	Representative of Hospitality & Food Sector	Analysis
5. How can we overcome these barriers to innovation?	Acceptance to change and mindset, raise awareness.	Educate the entrepreneurs, Provide business facilitation (ease of doing business)	Be brave, Adapt to new changes, Agile methodology should be implemented, Competition helps innovation, Use of new technology.	Education system should concentrate on brain storming	Loans from financial institutions	Ask for financial assistance from third parties - This resulted in a much better service being provided. Has diversified by expanding its business	1. Educate and Provide training, 2. Financial assistance 3. Adapt to changes
<i>Probe: How have you helped your SMEs/ SMEs to overcome these barriers? Were they successful?</i>					Has taken loans from banks		
6. According to you, what policies can be implemented to further promote innovation?	Already mentioned above.	More Intellectual Property Rights, More hygiene	Bring Mauritius on the international market for accessibility to patents and licenses. Evolve the Laws and provide guidelines to innovate. Policymakers should be proactive. Increase funding. Provide basic information to entrepreneurs - Idiot proof information	Make Mauritius a digital island – Good internet connection at affordable fees, offer online services.	Provide training facilities to entrepreneurs, Provide financial assistance (subsidies) and low interest on loans	More offer of grants, Create awareness about SMEDA, Offer financial assistance	Finance legislation ICT
<i>Probe: Can you suggest some measures/ incentives that can drive innovation?</i>							

QUESTIONS/ RESPONDENT	Senior Advisor on SME matters Min of Cooperative	Managing Director SMEDA	Representative of the ICT Sector	Representative of the Service Sector	Representative of Transport Sector	Representative of Hospitality & Food Sector	Analysis
7. Have you seen any particular changes regarding innovation within SMEs in Mauritius during the past years?	New SME entrepreneurs are more prone to innovation but old ones are reluctant to changes- They refuse partnerships with SADC/COMESA.	Positive- It has been increasing	None in the ICT sector	It is slow but it is going in the right direction because the market is small.	Yes- It has been increasing. There is room for innovation and this shall create employment. The prediction is positive in the transport service sector.	No innovation at all because people lack financial assistance.	On the lower side
<i>Probe: Can you describe the trend for innovation in SMEs in one word (can suggest - was it constant, was it increasing or was it decreasing?</i>							

Table 27: Summary of responses to interviews

4.5 Summary of Findings

4.5.1 Survey

Given the similarity of many factors, they were consolidated into various categories, of which

- Finance was the primary factor influencing innovation
- Other factors did have an impact, but in the statistical sense, a relatively minor one compared to finance
- The only factor to truly stand out aside from finance was the personality of the entrepreneur
- Finance refers to all financial considerations that positively influence a business (good cash flow, high profit, etc.)
- Personality refers to traits that correlate with innovation (creativity, risk aversion, ambition, etc.)
- The major barriers to innovation were under the categories “Business Model” and “Collaboration”
- Both were comparably and statistically meaningful considerations
- Business Model regroups all factors relating to the nature of the business itself that might inhibit innovation (weak HR structure, low profit margin, etc.)
- Collaboration regroups all factors relating to an unwillingness or inability to solicit outside assistance – paid or otherwise – to facilitate innovation.

4.5.2 Interviews

The interviews were mapped into a grid for comparison, and the following commonalities emerged:

The following findings of the interviews generally align with those of the survey

- Financial assistance and personality were generally described as innovation drivers.
- Interviewees tended towards product and service innovation, rather than process.
- Interviewees were of the opinion that SME innovation was not significant
- Business model related reasons were considered to be a major barrier to innovation

The following findings of the interviews departed from the findings of survey

- Personality and finance were put on parity by interviewees, but the survey indicated finance was a more important consideration.
- Collaboration was not brought up as a major barrier to innovation i.e. the amount of outreach from the authorities, financial support notwithstanding, was deemed adequate.

- Interviewees were keen on training SMEs on innovation as a possible venue for improving same. This was not deemed to be a major need at the survey level.

This points to a possible disconnect between what is being offered to SMEs to drive innovation, and whether or not SMEs want it in the first place.

5. DISCUSSION

The findings, prima facie, might seem to validate popular wisdom:

Drivers

Financial assistance aspect

The following aspects were prominent in the factor analysis:

- Q 14k – Provision of innovation incentives
- Q 14l – Setting up of Grant Schemes
- Q 14m – Financial assistance from institutions

Finance or the lack thereof is the primary factor that advises willingness to innovate

Personality aspect

This refers to the following questions:

- Q 14e - Ambition of entrepreneurs
- Q 14f - Tolerance of new ideas and new ways of doing things
- Q 14g - An increased ability to forecast future scenarios

Individuals with more creative/risk loving/ambitious personalities are more willing to innovate

Barriers

Business model aspect

Business models construct was derived from the following questions:

- Q 15k – Reluctance of franchising of products/services
- Q 15l – Inability to relocate the products/services in new markets

The typically low-cost business model of SMEs greatly inhibits their ability to innovate.

Collaborative aspect

This aspect related to the following questions:

- Q 15h – inability to satisfy the market demand
- Q 15i – lack of knowledge sharing among colleagues
- Q15j – lack of collaboration with other local small firms

The inability/unwillingness of SMEs to reach out to third parties further inhibits their innovative potential.

There is, however, a significant degree of nuance to each point that we will explore in further detail.

5.1 Finance driven innovation

While the literature did propose that access to finance can encourage innovation (Cassar, 2004; Popov & Rosenboom, 2013; Kim et al, 2016), it is important to stress that the present study is about intention and perception. While the opinion of the business community carries more weight on business matters, it should not obfuscate the fact that this is their opinion. Even if Mauritian entrepreneurs and policy makers believe innovation to be tied to financial health, this does not make it a hard fact. Rather, this is clear evidence that most people believe innovation to be inherently expensive, following perceptions of respondents as in Table 6 whereby innovation was mostly perceived as being product-oriented.

The reason for this perception is probably rooted in a one-dimensional view of innovation; namely that innovation stems from sizeable capital investment or equally expensive product innovation. This is concerning, because it points to an entrepreneurial mindset that might be prone to overlook innovation that does not involve either of these aspects. It must also be pointed out that successful innovation may not originate solely from expensive scientific research and technology, but also from new business models, cheaper technologies, new design and structural organizational changes.

Keegan et al (1997) mentioned that the high costs associated with innovation do affect small firms more than larger ones. Furthermore, the view that finance was a barrier to innovation was also mentioned for Indian SMEs by Pachouri & Sharma (2016).

When we consider the largest innovations in recent memory, many of them stemmed from the proverbial “American garage/basement”. The origins of Facebook have entered popular consciousness as the result of college students trying to create an easy way of contacting their friends.

While this does not change the fact that innovation can be expensive, it does not have to be, and it does point to the potential for educating both aspiring and current entrepreneurs on the need to think in terms of “cheap” innovation. That being said, this conviction that innovation is “finance-driven” should not be overlooked; from a budgetary standpoint, it means that the

government can in-fact drive innovation by injecting money into SMEs for this express purpose.

This, however, must not be done lightly. Mauritius is, after all, a country of limited means. A perception of high-cost innovation will, in all due likelihood, translate into equally expensive attempts at innovation. Therefore, any attempt to stimulate SME innovation through any financial stimulus package should be undertaken carefully, and the investment monitored and shaped to ensure efficient use of state resources.

Furthermore, a broader understanding of business innovation strategies (apart from expensive high tech origin) can lead to a different set of more affordable support measures.

5.2 Personality driven innovation

Burger-Helmchen (2008) posited that CEOs personal views and traits can affect firm performance and strategic directions. The relevance of personality to innovation might seem to go without saying. Some people, after all, are inherently more willing to try new things than others. As such, it is easy to dismiss this as a trivial finding, one that is difficult to influence. However, the research itself did point to the fact that innovation might be less personality driven than most would think.

In strict statistical terms, personality was the second most important consideration, but was almost half as likely to influence the decision to innovate as finance. In other words, even inherently risk averse entrepreneurs are likely to innovate if they feel the financial situation allows for it. This is compelling for a number of reasons, not least of which being that the inherently insular nature of an island state society might not be as limiting on Mauritius' ability to innovate.

This is not to say that it should be overlooked in the discussion of how to improve our potential. Brought down to simpler terms, if Finance is the primary indicator of an entrepreneur's ability to innovate, then Personality can be seen as a measure of their willingness to innovate. While this study indicates that the willingness is less of a concern than ability, it is a concern nonetheless, one that should be second on the priority list of any initiative to enhance SME innovation.

Fadaee & Alzark (2014) did mention that although technology is vital, the entrepreneur's creativity, innovation and entrepreneurship capabilities are also a requirement.

Since the personality aspect referred in the survey to issues like the ambition of entrepreneurs, their tolerance to novelty and ability to forecast future scenarios, it can be construed that training could change attitudes and behavior. Training with potential to change mindsets includes business and innovation management, accessing finance creatively and doing business abroad. In addition, training in design driven innovation, i.e. in creation of new products and services could be considered.

5.3 Business models as a barrier to innovation

It is important to stress that this point relates to elements that inhibit an SME's ability to innovate by factors that are often inherent to being an SME. All innovations will, for example, require some form of investment. As mentioned before this need not be expensive, but innovation will have some cost. For any business that sells a large number of products, this can have a minimal impact on the average cost of their product, because the investment can be spread across more products. A feature of SMEs operating in many industries, however, is that they do not have the sales of larger players. As such, "passing on the cost to the consumer" is often a forbidding proposition, as this will inflate the cost of their product tangibly.

Similarly, most SMEs tend to be one-dimensional in their focus on delivering a core product or service. This extends to all aspects of operation, be it in terms of advertising, HR, production or customer care. The simple need to maximize value from every aspect of operation will result in organizations that typically operate on the bare minimum of everything. This in turn means that innovation which, by definition, means doing something more or something different, may be beyond their natural means.

The above two do not constitute all the reasons why SMEs inherently struggle to innovate, but should serve to illustrate this argument. Broadly speaking, most SMEs often exist in a space whereby the ability to innovate may be locked up to and until they have the scale (sales, support staff, spare capacity) to accommodate for innovation.

While this might seem to be straightforward – let businesses grow until they can innovate – this is potentially damaging for a number of reasons. One of the biggest one is the risk that the SME might grow without ever feeling the need to innovate, relying on same 'tried and tested' formula, often for years on end.

The business model barrier may be due to lack of awareness, or else readiness to adopt novel concepts in departure from the 'tried and tested' successful ones. They may include :

- ICT solutions
- sustainability (economic, social and environmental)
- energy efficiency
- food security

The above could also trigger a sectoral approach for business innovation support agencies.

Furthermore, the business model barrier could be addressed by facilitating access to technology services e.g support institutions providing services such as prototyping, testing, and pilot production. There is currently a collaborative project between SME Mauritius and National Computer Board to provide 3D printing services to SMEs.

Unwillingness or inability to change the business model appears therefore to be a barrier to innovation. Adekalum (2014) did mention that Finland SME's could recreate and deliver better offering of their products by turning round their business models.

While tailoring business models to match customers and market needs (sales processes, supply chain modeling) may appear obvious, this is also related to the intrinsic competences of the business owner/staff.

5.4 Collaboration as a barrier to innovation

The willingness to reach out to third parties is, according to the research team, one of the most concerning facts to emerge from this research. As the previous three points should have served to illustrate, SMEs struggle to innovate for a number of reasons. Accordingly, one of the few ways to reliably enhance their ability to innovate is by way of third-party intervention.

However, the business community itself admits that local SMEs do not struggle to seek, or even accept outside help. Over the course of the survey, many respondents were invited to comment on why this is. The statements were not recorded owing to the open ended nature of such observations, reasons ranged from “distrust of the institutional support system” (for when this assistance came from a government or para-public body) to what many described as “entrepreneurial arrogance” (i.e. many entrepreneurs find it difficult to accept that anyone “can know their business better than them”). Even support institutions may benefit from

collaboration e.g. in peer learning of innovation agencies through mutual exchange of best practices.

While many of these might seem “irrational”, these are nonetheless very powerful personal stances and opinions that are difficult to overcome. A few business owners even admitted that, even though innovation was important, they did not see themselves reaching out for help unless the survival of their organizations depended on it.

On the supply side of this narrative, many business owners stressed they did not really know who to turn to. This is somewhat baffling given the sheer number of institutions with an implicit or explicit mandate to assist SMEs. Nonetheless, it must be recognized that many organizations – SMEs in particular – will often operate inside “market bubbles”, interacting only with a handful of customers and suppliers and without ever looking, or indeed, having to look beyond the immediate proximity.

Collaboration can be fostered through an interactive platform to act as an information portal and a networking instrument. Such an E-platform would promote the competences, interests and skills of stakeholders and enable online interaction between suppliers, customers and even potential investors.

In addition, the following can be enabled:

- mentoring and coaching activities
- advertising and registration for participation in events such as trade fairs both local and international
- commercialization of innovative ideas and solutions
- any information on seed funding or finance for innovation and growth.

In general, collaboration has far reaching perspectives in connecting suppliers with customers, university-industry linkages, entrepreneur-investor links. Pachouri & Sharma (2016) did concur that information is a major barrier to innovation in Indian SMEs.

This can take a very literal meaning; looking at the fast food industry in particular, many corner snacks operate turnovers in the hundreds of thousands without ever having to look past their doorstep for anything. This insularity can create an equally insular mindset that makes it difficult to even consider third party outreach as an avenue to innovate. Govas et al (2013)

mentioned that risks perceived by SMEs that result in unwillingness to cooperate and share knowledge.

5.5 Marginal influencers

As mentioned earlier (refer to 4.3.1.7), one possible construct as innovation enhancer was ‘training facilities to deal with new technology’ and this was not consistently backed by the literature review. Training in new technology may be difficult to implement by single firms because the cost cannot be spread over a large number of staff. However, support institutions could provide the training for the industry as a whole for scale economies. The printing industry is one of the industries where such specific training is necessary but difficult to implement, unless industry wide.

6. RECOMMENDATIONS & CONCLUSION

In the light of the preceding discussion, the research team would like to propose the following recommendations:

6.1 “Demystify” innovation

As stressed before, most Mauritian entrepreneurs see innovation as a finance hungry undertaking. In an effort to encourage more innovation and more efficient innovation, it is important to educate SMEs on the various layers of innovation. In particular, there should be a distinction made between costlier/riskier forms of innovation (e.g. developing and launching a new product) and cheaper/safer forms of innovation (e.g. improving internal processes).

This could potentially take the shape of a national sensitization campaign. On a smaller scale, workshops could be organized by various stakeholder groups like business support agencies, chambers of commerce to create awareness on broader innovation strategies.

This could also be built in the academic program at various academic levels e.g. modules in creativity and innovation across faculties.

6.2 Creating structures to ensure good return on investment for innovation stimulus packages

Care should be taken with any government driven initiative to improve SME innovation. Research clearly indicates that the lack of innovative drive cannot be solved by throwing money at the problem. Any cash award should ideally be well structured, and steps must be taken to ensure all recipients spend their money wisely (training, advice, consultancy, etc.)

The MRC has devised frameworks for awarding Innovation grants. However, this needs to be taken one step further; other institutions need to take part in the facilitation process e.g. support institutions providing the services of a mentor to hand hold and follow up on progress.

6.3 Fairly recognize the relevance of entrepreneurial culture

It is important not to understate, or overstate the relevance of personality in the discussion. While any attempt to enhance SME innovation should devote some resources on the entrepreneur as an individual, this should be overvalued in the wider discussion. In an effort

to provide anyone tackling this issue with a working number, the research would like to propose the following ratio

Finance: Personal Coaching: All other considerations = 2:1:1

This reflects the relative statistical weight awarded by entrepreneurs themselves for each category in the survey. For example, if someone is looking to conduct a one hour training to promote SME innovation, 30 minutes should be spent on financial considerations (how to finance innovation, how to assess return on investment), 15 minutes on motivating the participants (e.g. presenting successful entrepreneurs as source of inspiration) and the last fifteen minutes given to any other question the audience might require (i.e. all other considerations).

The above is a loose example, but could also potentially advise effective budget allocation when promoting SME innovation.

Shaping an entrepreneurial culture in the community is a long-term endeavor. In Finland, they carried out a ten-year plan for this purpose. Developing an entrepreneurial culture involves the following:

- The educational system - from the primary to tertiary level
- The support of the Press
- Promotion of role models
- The legislative framework for business
- Government policy among other initiatives

6.4 A national Guideline for SME growth

Even though most SMEs cannot truly consider innovation in their infancy, there should come a time when they do. However, this research indicates that it is unrealistic to expect them to identify the what, how, why, where and when of this on their own. Accordingly, there is a need to create a publicly retrievable “SME Guideline”.

For example, this guideline would provide SMEs with a sense of when in their business lifecycle they should be looking at investing in various resources, be they human, capital, or intellectual property. This will go a long way towards providing business owners with simple answers to problems that are often beyond their expertise. For example, all business owners recognize they eventually need to integrate ICT in their business operations, but most of them

struggle to implement this (e.g. Should I outsource or hire a programmer? What can a software do for me?).

The answer to these questions might as well be found on an E-platform where sharing of information and networking can be enabled. The platform may even enable a training needs analysis for specific industries, such training to be provided by support institutions and the cost of same spread among a large number of participants.

The guideline may also advise where in the value chain or where in the supply chain in the industry innovations can be brought about. Furthermore, a guideline can answer the ‘How to innovate’ e.g. is there scope for a number of incremental innovations, keeping in mind that disruptive innovations are generally the realm of large firms. The answer for smaller firms rather lies in simpler process or business model innovations.

Naturally, the establishment of such guideline needs to be the subject of an extensive, multidisciplinary research project that will most likely reach across multiple institutions. Nonetheless, a publicly available guideline could potentially circumvent the “shyness” of SMEs in seeking advice by offering them an impersonal access to best practice within the field of innovation.

6.5 Improve the image and visibility of support institutions and their SME innovation initiatives

Many of the reasons why an entrepreneur might not want outside assistance to drive innovation are not rational, they are still the customers that many support institutions are mandated to assist. As the research indicates, simply offering the right service is not sufficient; the entrepreneur needs to have sufficient awareness and trust in the provider to actually avail themselves of the service. For example, many businesses simply do not opt into government services of any kind because they believe they will have to disclose financial information, when they in fact may not. Simply stating this clearly can go a long way towards building trust with SME owners.

This recommendation is, in the opinion of the research team, the one that deserves the most immediate action; many public and para-public bodies have invested heavily to create well-polished quality support services that, in some cases, actually involve SMEs receiving money for obtaining a service, rather than paying for it. However, if these services and funds are not being utilized, then this represents a wasted investment.

While this might, on the surface, seem like a frivolous use of budget, public image of support institutions greatly influences the willingness of entrepreneurs to commit to any undertaking, even for their own benefit. Accordingly, there is a real need for all innovation drivers to invest more resources in simply marketing their services to the business community.

Another approach for support institutions would be to adopt a targeted sectoral approach, based on the assumption that different sectors may need tailor-made solutions and not a one-size-fits-all solutions.

Furthermore, a thematic approach could be taken, e.g. Intellectual Property rights, ICT solutions, sustainability, energy efficiency or food security in search of innovation initiatives. Likewise, local support institutions can benefit from peer learning by networking with foreign support institutions having similar objectives in view of exchange of best practices.

6.6 Conclusion

For the purpose of the study, we surveyed the existing literature for recurring drivers and barriers to innovation for SMEs. Same were integrated in the survey questionnaire. Both the quantitative survey and qualitative interviews with stakeholders revealed finance and personality as main drivers of innovation whereas business model and collaborative aspects were the main barriers to innovation among Mauritian SMEs.

We recommend several actions that will help enhance innovation among the Mauritian SMEs: These include demystification of innovation, the provision of structured stimulus packages, the promotion of an entrepreneurial culture and adequate marketing of support institutions services. The setting up of a National Innovation policy framework with proper guidelines will provide the necessary support for SME innovation in Mauritius.

6.7 Future research

Based on constraints to obtain accurate statistics on SMEs, we propose further research on the classification of SMEs at the different institutions and to come up with a national definition for Mauritian SMEs in view of standardization. Based on this standard SME definition, a national survey could be conducted to collect information on Mauritian SMEs and create a National SME database; which will provide accurate data for policy making and research.

A larger scale study could be carried out based on more accurate data to confirm our preliminary findings. A better assessment of the perception of innovation among SMEs may highlight any bias on the finance and cost issues, SMEs possibly being relatively unaware of other forms of innovation e.g. process and business model innovation and generally innovation opportunities along the business value chains rather than technology only.

Studies have shown that while there are general factors/barriers of innovation that apply to all SMEs, there are also sectoral differences that should be considered when designing appropriate tools for enhancing innovation in specific sectors e.g. technology and non technology driven SMEs (Bozic & Rajh, 2016). However, our sample size was too small for in-depth study sectorwise. Further studies targeting specific SME sectors could help identify sector specific needs, which will lead to targeted actions.

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ANNEX 1: Statistical Analysis

Factor Analysis

Factor Analysis attempts to represent a set of observed variables in terms of a number of common ‘factors’ plus a factor which is unique to each variable. The common factors are hypothetical variables which explain why a number of variables are correlated to each other. Note that Factor Analysis is usually used for data reduction purposes.

- The Factor Analysis Model

If the observed variables are $X_1, X_2 \dots X_n$, the common factors are $F_1, F_2 \dots F_m$ and the unique factors are $U_1, U_2 \dots U_n$, the variables may be expressed as linear functions of the factors:

$$\begin{aligned} X_1 &= a_{11}F_1 + a_{12}F_2 + a_{13}F_3 + \dots + a_{1m}F_m + a_{1U}U_1 \\ X_2 &= a_{21}F_1 + a_{22}F_2 + a_{23}F_3 + \dots + a_{2m}F_m + a_{2U}U_2 \\ &\dots \\ X_n &= a_{n1}F_1 + a_{n2}F_2 + a_{n3}F_3 + \dots + a_{nm}F_m + a_{nU}U_n \end{aligned} \quad \longrightarrow \quad \text{Equation 2}$$

This equation is a regression equation and factor analysis seeks to find the coefficients $a_{11}, a_{12} \dots a_{nm}$ which best reproduce the observed variables from the factors. The coefficients $a_{11}, a_{12} \dots a_{nm}$ are weights in the same way as regression coefficients. For example, the coefficient a_{11} shows the effect on variable X_1 of a one-unit increase in F_1 . In factor analysis, the coefficients are called loadings and in the model above, a_{11} is the loading for variable X_1 on F_1 , a_{23} is the loading for variable X_2 on F_3 , etc.

By the same token, the sum of the squares of the coefficients for a factor, for instance for F_1 it would be $[a_{11}^2 + a_{21}^2 + \dots + a_{n1}^2]$ and they show the proportion of the variance of all the variables which is accounted for by that factor.

The Model for Individual Subjects

Equation (4) above, for variable 2, say, may be written explicitly for one subject i as:

$$X_{2i} = a_{21}F_{1i} + a_{22}F_{2i} + a_{23}F_{3i} + \dots + a_{2m}F_{mi} + a_{2U}U_{2i} \quad \longleftarrow \quad \text{Equation 3}$$

This form of the equation makes it clear that there is a value of each factor for each of the subjects in the sample; for example, F_{2i} represents subject i 's score on Factor 2.

The Model for Factors

There are two types of factors namely unique and common. Unique factors are not correlated with each other whereas common factors can be expressed as linearly in terms of the observed variables.

$$F_i = W_{i1}X_1 + W_{i2}X_2 + W_{i3}X_3 + \dots + W_{ik}X_k \quad \longleftarrow \text{Equation 4}$$

Where

- F_i is the estimate for the i^{th} factor
- W_i is the factor score coefficient
- k is the number of variables
- Stepwise Formulation for Conducting a Factor Analysis

To conduct factor analysis, seven steps namely reliable measurements, correlation matrix, factor analysis versus principal factor analysis, the number of factors to be retained, factor rotation, and use and interpretation of the results should be adhered to.

STEP 1: Measurements

As per Field (2000), the used variables should first of all be measured at (at least) an interval level. Secondly, the variables should roughly be normally distributed thus makes it possible to 'generalize the results of your analysis beyond the sample collected. Thirdly, the sample size should be taken into consideration as the correlations are not resistant (Moore and McCabe 2002).

In this optic, the communalities are considered where the communality of a variable represents the proportion of variance in that variance that can be accounted for by all ('common') extracted variables. Thus the higher the communality of a variable, the higher the proportion of variance accounted by the extracted variable. However, if ever the communalities are not so very high, the sample size has to compensate for that (Field, 2000). To check whether the sample size is big enough the following should be considered:

- Kaiser-Meyer-Olkin (KMO) Measure of Adequacy
- The sample size is said to be adequate if the value of KMO is greater than 0.5.

- *Anti-Image* of Covariance and Correlation.
- All the elements on the diagonal of this matrix should be greater than 0.5 so that the sample size is adequate.

STEP 2: Correlation Matrix

One assumption of factor analysis is that the variables are correlated through some external variables and to draw up a correlation matrix, the Bartlett's Test of Sphericity should be considered. The former tests whether the null hypothesis which is there is no correlation between the variables in a population, is an identity matrix. If the p-value is greater than 0.5, the test statistics is large thus rejecting the null hypothesis and concluding the existence of correlation between the variables.

STEP 3: Factor Analysis versus Principal Component Analysis

The main difference between factor analysis or principal component analysis lies in the way the communalities are used. In principal component analysis it is assumed that the communalities are initially 1. In other words, principal component analysis assumes that the total variance of the variables can be accounted for by means of its components (or factors), and hence that there is no error variance. On the other hand, factor analysis does assume error variance.

According to Field (2000: 434) theoretically, factor analysis is more correct, but also more complicated. Practically, however, "the solutions generated from principal component analysis differ little from those derived from factor analysis techniques" (Field 2000: 434). In Rietveld & Van Hout (1993: 268) this is further specified: "the difference between factor analysis and principal component analysis decreased when the number of variables and the magnitudes of the factor loadings increased".

The choice between factor analysis thus depends on the number of variables and the magnitude of the factor loadings. After having made this choice, the question arises how many factors there are to be retained.

STEP 4: How many factors to retain

Some rules of thumb have been suggested for determining how many factors should be retained (Field 2000 ; Rietveld & Van Hout 1993):

1. Retain only those factors with an eigenvalue larger than 1 (Guttman- Kaiser rule)
2. Keep the factors which, in total, account for about 70-80% of the variance

3. Make a scree-plot⁵; keep all factors before the breaking point or elbow.

It is furthermore always important to check the communalities after factor extraction. If the communalities are low, the extracted factors account for only a little part of the variance, and more factors might be retained in order to provide a better account of the variance.

STEP 5: Rotation of factors

Component matrix expresses the variables in terms of factors and their coefficients are referred as factor loadings. The total variance, communalities and % variance explained are not affected by rotation.

STEP 6: Interpretation of factors

High factor loadings' variables on the same factor are considered. Then, they are interpreted in terms of those variables, summarizing them into categories.

STEP 7: Determination of model fit

The difference between variables that can be reproduced from estimated correlations between variables and factors are called residuals. Moreover, if there are many large residuals (> 0.05), it is not appropriate to use factor analysis to the data and reconsideration about the model is necessary.

Generalized Linear Model (GLM)

Nelder and Wedderburn (1972) defined GLM as a significant combination and extension of familiar regression models such as the linear models and the logit and probit models.

Normally, in a general linear model is in the following form:

$$Y_i = \beta_0 + \beta_1 x_{i1} + \beta_2 x_{i2} + \beta_3 x_{i3} + \dots + \beta_p x_{ip} + \epsilon_i \quad \leftarrow \text{Equation 5}$$

There are two sections in this model:

i) The Exponential Family of densities

The exponential family can be normal, Poisson, gamma, binomial, exponential and inverse normal whose densities can be written in the form as shown below:

$$(y; \theta, \phi) = \left[\frac{\theta - (\theta)}{\phi + c(y, \phi)} \right] \quad \leftarrow \text{Equation 6}$$

Where \emptyset is the dispersion parameter and θ is the canonical parameter.

ii) Link function

The link function (μ_i) is expressed as a linear function of the independent variables. It is defined as:

$$(\mu_i) = \theta_i = \beta_0 + \beta_1 x_{i1} + \beta_2 x_{i2} + \beta_3 x_{i3} + \dots + \beta_p x_{ip} \quad \longleftarrow \text{Equation 7}$$

For this study, a binary logistic model will be used for predicting.

Binary Logistics Regression

- Binary Logistics Regression is a type of regression analysis where the dependent variable is a dummy variable (coded 0, 1), that is, is binary in the form ‘Yes’ and ‘No’. For our study, two binary logistics regressions will be run where the dependent variables for Regression 1 and Regression 2 will be ‘*Are you willingness to innovate*’ and ‘*Are you able to innovate*’ respectively.

Note that, considering Regression 1, the probability can be of the form:

$$Z = \begin{cases} 1 & \text{if the SME entrepreneur is willing to innovate} \\ 0 & \text{if the SME entrepreneur is not willing to innovate} \end{cases}$$

As for Regression 2, the probability can be of the form:

$$Z = \begin{cases} 1 & \text{if the SME entrepreneur is able to innovate} \\ 0 & \text{if the SME entrepreneur is not able to innovate} \end{cases}$$

In this study, binary logistic will be applied to know the probability that SME entrepreneur willing and is able to innovate their firm following a given set of explanatory variables like highest academic qualification, experience, company’s annual turnover and the targeted market. The probability that the SME is willing and is able to innovate (probability of success) is given by π and the probability of failure is $(1-\pi)$.

Under the Binary Logistic Regression, some of vital assumptions are as follows:

- The binary logistic regression requires the dependent variables to be binary.
- Since the logistic regression assumes that $P(Y=1)$ is the probability of the event occurring, it is necessary that the dependent variable is coded accordingly.

- c. The model should be fitted correctly- No over fitting or under fitting should occur that is only meaningful variables should be included.
- d. The Error term should be independent and the model should have little or no multi-collinearity.
- e. Logistics Regression assumes linearity of independent variables and log odds otherwise the test will underestimate the strength of the relationship and will reject the null hypothesis (claiming not being significant) where it should be significant.
- f. Lastly, it requires large sample sizes.

- **Odds Ratio and Logit**

Odds ratio are defined as the ratio of the probability of success and the probability of failure shown below:

$$\text{Odd ratio} = \pi_i / (1 - \pi_i) \quad \longleftarrow \quad \text{Equation 8}$$

Conversely, the Logit is given by:

$$\text{Logit}(\pi_i) = \ln(\pi_i) - \ln(1 - \pi_i) \quad \longleftarrow \quad \text{Equation 9}$$

The above equation is referred as the log odd ratio.

$$\ln(\pi_i) = \beta_0 + \beta_1 x_{i1} + \beta_2 x_{i2} + \beta_3 x_{i3} + \dots + \beta_p x_{ip} \quad \longleftarrow \quad \text{Equation 10}$$

Where, π_i is denoted as the probability of the i^{th} person who is able/willing to innovate. $x_{i1}, x_{i2}, \dots, x_{ip}$ are the explanatory variables.

- **Multiple Regression**

Multiple Regression is a statistical tool that allows examining how multiple independent variables are related to a dependent variable and once the relationship between the dependent variables and these explanatory variables have been identified, using all the information obtained, accurate predictions will be made. The formula for Multiple Regression is given as:

$$Y = \alpha + \beta_1 X_1 + \beta_2 X_2 + \dots + E_i$$

The foremost aim to conduct the multiple regression is to identify the factors that influence the SME entrepreneur's intention to innovate.

For our study, post factor analysis, using the factors as explanatory variables, a multiple regression will be run on the dependent variable which measures the intention of a SME entrepreneur to innovate. Note that the dependent variable is a continuous variable whilst the factors are ordinal.

Variables	Nature	Description of the nature of the variable
Regression 1		
Are you willing to innovate?	Binary	Dependent variable - The responses is with only two states
In which market has your firm been operating	Nominal	Independent Variable-They are categories with No intrinsic ranking
Company's Annual Turnover	Nominal	Independent Variable-They are categories with No intrinsic ranking
Regression 2		
Are you able to innovate?	Binary	Dependent variable - The responses is with only two states
Highest Education Qualification	Nominal	Independent Variable-They are categories with No intrinsic ranking
Number of years working as entrepreneur	Nominal	Independent Variable-They are categories with No intrinsic ranking
Company's Annual Turnover	Nominal	Independent Variable-They are categories with No intrinsic ranking
Regression 3		
On a scale of 1 to 10 (1 = Less unlikely to 10 = Highly likely), rate your intention to innovate?	Continuous	Dependent Variable - Here, the entrepreneur should give a rating to his/her intention to innovate
Factors	Ordinal	Explanatory Variables- They are factors obtained post factor analysis.

Table 28: Summary of explanatory variables for each regression

ANNEX 2 Questionnaire

Questionnaire number

Assessing the Factors influencing SME Innovation in Mauritius: A Survey among Entrepreneurs

Dear Participant,

The aim of this study is to identify the factors that influence SME innovation in Mauritius. It shall outline and hierarchize the promoters as well as the barriers to innovation within a SME.

This questionnaire should take you around 10 minutes to complete. As such, there is no right or wrong answer. However, the usefulness of the survey findings depends on the accuracy of your answers. Rest assured that all data will be kept confidential and used for research purposes only, and that research findings will be published in an impartial manner.

Your participation is entirely voluntary and you have the right to withdraw at any given moment. Should you have any queries or concerns about being part of this survey, please contact us via e-mail: soobhugn@gmail.com or d.seethiah@uom.ac.mu.

Thank you for your precious time and co-operation in giving your personal views.

SOOBHUG Ashwinee Devi
Researcher

PLEASE READ THESE INSTRUCTIONS CAREFULLY

1. Please use black or blue ink to fill the questionnaire by ticking the appropriate box(es).
2. In accordance with the Data Protection Act 2004, responses are anonymous and completely confidential. By responding to this questionnaire, you are agreeing that the data that you provide may be used for research.

FYI

Definition of Innovation:

Innovation can be defined as finding a more effective way of doing something or the application of enhanced solutions that meet new requirements (Beynon *et al.*, 2015).

SECTION A: DEMOGRAPHIC INFORMATION

1. Gender

- ☐ Male ☐ Female

2. Age group (years)

- ☐ 18 – 24 ☐ 45 – 54
☐ 25 – 34 ☐ 55 or more
☐ 35 – 44

3. Residential area

- ☐ Urban ☐ Rural

4. Highest academic qualification

- ☐ CPE or below ☐ Certif./Diploma
☐ Vocational ☐ Undergraduate
☐ SC or equivalent ☐ Postgraduate
☐ HSC or equivalent ☐ Professional*
☐ Full-time

* *E.g. ACCA, ICOSA, etc.*

5. Number of years operating as entrepreneur

- ☐ Less than 1 ☐ 7 – 9
☐ 1 – 3 ☐ 10 or more
☐ 4 – 6

6. Sector of operation

- ☐ Agriculture (incl. Bio-farming) & Agri-Business
☐ Aquaculture & Ocean economy-related activities
☐ Construction
☐ Education
☐ Financial and Insurance activities
☐ Handicraft (locally manufactured)
☐ Health & Social Work
☐ Hotels & Restaurants
☐ Information & Communication Technology
☐ Manufacturing
☐ Other Services
☐ Public Administration
☐ Real Estate, Renting & Business Activities
☐ Textile
☐ Transport, Storage and Communications
☐ Wholesale & Retail Trade
☐ Others, please specify,.....

7. In which market has your firm been operating?

- ☐ Local ☐ Both
☐ International

8. Annual turnover (Rs M)

- ☐ Less than 10 ☐ More than 50
☐ 10 – 50

9. Company size (number of employees)

- ☐ 1 – 10 ☐ 21 – 50
☐ 11 – 20 ☐ More than 5

SECTION B: PERCEPTION OF INNOVATION PRACTICES

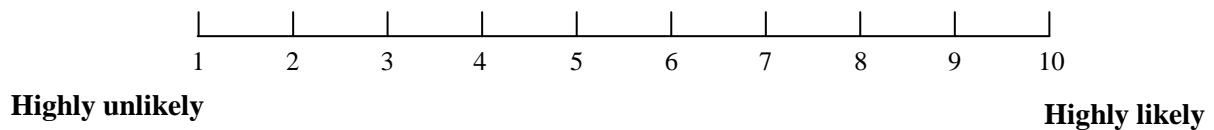
10. According to you, what **best** describes “innovation”? Tick **only one** option.

- ☐ Commercialization of a new product and/or process
- ☐ Invention of a new product and/or service
- ☐ New product and/or product concept
- ☐ Implementation of a new production process

11. Please tick the appropriate box for each of the following.

	Yes	No
Are you willing to innovate?		
Are you able to innovate?		
Are you currently innovating in your firm?		
Have you implemented any innovative idea (s)?		

12. On a scale of 1 to 10 (1 = Highly unlikely to 10 = Highly likely), rate your intention to innovate? Please **ENCIRCLE** your answer (number) clearly.



13. If you have given a rating of 6 or more in Question 12 above, please rate how often you would bring about the following [1 = Very rarely to 5 = Very often]:

	1 = Very rarely 2 = Rarely	3 = Occasionally	4 = Often 5 = Very often	1	2	3	4	5
1.	New or significantly improved goods and services			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2.	New or significantly improved manufacturing and distribution processes			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3.	Major changes in the skills of the workforce through the provision of training and development programmes			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4.	Relocation of existing products/ services in new markets			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
5.	Major changes in the organisational structure of the firm			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

SECTION C: ENHANCERS OF INNOVATION

14. Please rate the extent to which you agree that the following statements/factors are enhancers of innovation.

	1 = Strongly disagree 2 = Disagree	3 = Neutral/Not sure	4 = Agree 5 = Strongly agree	1	2	3	4	5
1.	Long-term vision			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2.	Provision of training facilities to workforce			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3.	Acquisition of new machinery and equipment			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4.	Acquisition of adequate knowledge on other firms and the market			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
5.	Ambition of the entrepreneur			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
6.	Tolerance of new ideas and new ways of doing things			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
7.	An increased ability to forecast future scenarios			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
8.	Adherence to Corporate Social Responsibility programmes			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
9.	Increased use of the Internet			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
10.	Entrepreneur's level of education			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
11.	Provision for innovation incentives			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
12.	Setting up of Grant Schemes			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
13.	Financial assistance from institutions (e.g. SMEDA, MauBank, DBM, etc.)			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
14.	Provision for fiscal incentives			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
15.	Presence of creative workforce			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
16.	Access to leasing finance			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
17.	Presence of qualified Human Resource Manager			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

SECTION D: BARRIERS TO INNOVATION

15. Please rate the extent to which you agree that the following statements/factors are barriers to innovation.

	1 = Strongly disagree 2 = Disagree	3 = Neutral/Not sure	4 = Agree 5 = Strongly agree	1	2	3	4	5
1.	Unstructured business management practices			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2.	Low number of employees			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3.	The intensification of competition level			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4.	Unwillingness to create value in new markets			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
5.	Operation in a less competitive market			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
6.	Low revenue			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
7.	Inability to spread the costs and risks among other suppliers			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

8.	Inability to satisfy the market demand	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
9.	Lack of knowledge-sharing among colleagues	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
10.	Lack of collaboration with other local small firms	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
11.	Reluctance to franchising of products/services	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
12.	Inability to relocate the products/services in new markets	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
13.	High costs of investment when innovating	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
14.	Economic crises	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
15.	Continued interaction with other suppliers results in a more friendly relations.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
16.	Location (e.g. an SME situated in a rural area may be less likely to opt for innovation as compared to a SME situated in an urban area)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
17.	Unhealthy working relationships with suppliers and customers during the research and development processes.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
18.	Lower level of sales	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
19.	Long payback period	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
20.	Lack of training and development programmes from support institutions (e.g. SMEDA, NPCC etc.)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
21.	Lack of investment to improve internal creative ideas	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
22.	Lack of awareness of competitors' strategies, the market and policy-makers' moves	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

**** End of questionnaire ****

Thank you again for your participation.

ANNEX 3: Questions guided interview

Objectives of the study ‘Assessing the factors that influence SME innovation in Mauritius’

1. To identify and hierarchize the factors that promote innovation in SME's in Mauritius
2. To identify and hierarchize the barriers to innovation in Mauritian SMEs.
3. To propose strategies to mitigate the barriers to innovation.
4. To propose ways to drive innovation.

Proposed Questions for interview

1. **What is your idea on innovation?**
 - *Probe: What are the ways you can undertake innovation? Why should you innovate?*
2. **What are the factors that can promote innovation?**
 - *Probe: Can you justify and support your answer?*
3. **Do you think altering the organisational structure of SMEs form part of innovation?**
 - *Probe: Can you propose ways through which you can alter your organizational structure? What are the advantages that it generates?*
4. **What are the barriers that you normally experience when attempting to innovate?**
 - *Probe: Which of the earlier mentioned factors can be categorized as the few most major barriers to innovation, according to you?*
5. **How can we overcome these barriers to innovation?**
 - *Probe: How have you helped your SMEs/ SMEs to overcome these barriers? Were they successful?*
6. **According to you, what policies can be implemented to further promote innovation?**
 - *Probe: Can you suggest some measures/ incentives that can drive innovation?*
7. **Have you seen any particular changes regarding innovation within SMEs in Mauritius during the past years?**
 - *Probe: Can you describe the trend for innovation in SMEs in one word (can suggest - was it constant, was it increasing or was it decreasing?*