

UNIVERSITY OF KWAZULU-NATAL

**Lean Start-up Methodology, a case study of customer development at
Invotech Incubator in KZN**

By

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DECLARATION

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ABSTRACT

The uncertainty created by a volatile global economy has forced large corporations to re-evaluate business strategy and reposition themselves to fend off potential threats relating to corporate sustainability. The inherent insecurity of the future has prompted the need for the development of a mitigation strategy, one that could buffer economic uncertainty to prevent the loss of jobs, the consequences of shrinking GDPs and increases in inflation. Empowering individuals by promoting the establishment of small businesses would be prudent, ensuring economic stability.

Though the risk relating to running a small business in comparison to a large corporation is perceived to be small, the economic consequences are not insignificant. The promotion of small businesses not only translates into a myriad of business formations, it is also met with an almost proportional number of failures. The high failure rate can be attributed to a number of reasons such as, poor product offerings, lack of entrepreneurial training and skills or simply unrealistic expectations. The creation of 'incubation services' are initiatives aimed to bridge the gap between a product and a consumer, where unskilled entrepreneurs are nurtured and grown to make calculated business decisions. It is imperative for small businesses to limit overhead costs and to deliver product to the market as quickly as possible, such that business models are evaluated in real time and the option to change strategy is relatively a simple transition.

This case study evaluates the strategic blueprint of the Innovation and Technology (Invotech) Incubation Centre in Durban in relation to lean startup practices. A semi structured interview was conducted with management of Invotech followed by a structured questionnaire administered to all incubatees assigned to Invotech which evaluated the implementation of lean startup techniques. A constant comparative method of analysis was used to identify categories and themes within the data.

The results of the study show that both management and clients at Invotech have a limited knowledge base of lean startup methodology, the study however identified that startups practice certain techniques associated with lean startup methodology, at Invotech, which has consequences for practioners in the field of lean startup methodology, prompting the need for further research.

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CHAPTER 1: INTRODUCTION

In an ever-changing society, the need to keep abreast and current with respect to consumers' needs and wants are distinct objectives that business leaders aim to achieve and maintain. Consumer spending drives business performance and promotes sustainability which in turn strengthens the economy by increasing GDP, creating jobs and beating inflation. The aftermath of the global economic crisis still resonates in many countries. Jobs lost, reduced spending and consumer awareness have left many organisations struggling to maintain sustainability, including Fortune 500 companies.

Due to a volatile economic climate, the successful creation of small medium enterprises (SME's) is a growth mechanism used by government to boost the economy in terms of GDP and creation of employment. Translating government's strategic view into a tangible objective relies on the creation of product and service offerings that consumers really need. With a plethora of options available to consumers, the need for startups and SME's to deliver product using an accelerated approach is paramount to remain viable and pave the way to success. Failure of a startup is not necessarily attributed to poor product offering but rather a poor response from consumers mainly due to lack of product purpose, lack of differentiation, lack of essential business skills and acumen by the entrepreneur or lack of novelty.

A technique that is redefining the operational practice of startups is lean startup methodology (Ries, 2011). Lean startup methodology is a technique that entails construction of a minimum viable product (MVP) which is tested by consumers and refined until a commercial product is available.

This chapter provides an overview of the research project including the motivation for the study depicting the current reality and contextualising the sequence of events. The focus of the study will be highlighted catalysing the generation of a problem statement. Research questions will be presented together with the specific research objectives that will be studied, such that the research questions can be answered.

1.1 Motivation for the study

The application of Lean start-up methodology is a technique applied to the development of new ventures around the globe to reduce operating expenses and expedite the process of delivering product to consumers. The methodology affords entrepreneurs the ability to test their product often called a minimum viable product (MVP) as early as possible (Ries, 2011). The purpose of the methodology is to determine market needs with intentions of mitigating risks that accompany new product development, such as poor market reception, poor sales and the most important commodity, time lost. By developing a MVP, a startup has the ability to evaluate ones product with actual feedback from consumers (market responses). The startup thus has the opportunity to change direction or pivot the business model in response to early market feedback without substantial monetary loss.

This study has been undertaken using Invotech as its location; making this incubator see benefits from the study. The research study will provide essential insight into current customer development at Invotech and demonstrate how Invotech can reposition and align itself to lean startup methodology practices using the recommendations developed. The incubatees of Invotech will also derive direct benefit from the study from their contribution to the research process as participants in the study. The participation of startups in the study will drive the change management process at Invotech, aligning Incubatee development with lean startup practices. Other Incubators could benefit from the study and apply the research findings to their incubator strategies, assisting Incubators to reposition and align their service offerings to lean startup methodology.

1.2 Focus of the study

Invotech is a Business and technology based incubator funded by the Small Enterprises Development Agency (SEDA) based in Durban. Invotech equips startups with essential business skills that are aimed at ensuring startups remain both viable during the incubation period and sustainable post incubation. Services rendered by Invotech include:

- Individual and group mentoring
- Business skills development
- Access to national and international business networks
- Access to financial institutions with preferential negotiated finance
- Assistance and guidance with business planning
- Support with tenders and proposals
- Assistance with management of financial records and other legislative company requirements
- Access to consultants and technical expertise at preferential negotiated rates
- Professional air-conditioned office space within a corporate business environment
- Shared receptionist with personalized front desk
- High speed bandwidth
- Access to boardrooms and meeting rooms
- Informal meeting areas
- Access to high technology equipment
- Access to telephone lines (charged)

The focus of the study was confined to startups currently assigned to Invotech as of January 2015, past Incubatees were excluded from the study. The study evaluated both Incubator and startup knowledge of lean startup methodology, providing recommendations on benefits and implementation strategies to roll out lean startup practices at Invotech.

1.3 Problem statement

Increased GDP, reduced unemployment and a sustainable economy are some tangible outcomes associated with successful startups. The high failure rate of startups is not due to lack of ideas and entrepreneurial potential but rather essential business skills that translate revolutionary ideas into tangible outcomes. Government interventions to reduce startup failure manifests itself in the form of Incubators. Incubators are support structures funded by both government and private institutions aimed to assist startups in building sustainable businesses. Measuring Incubator success has drawn much debate however, there are established mechanisms measuring performance of Incubation services. With the advent of lean startup practices sweeping the globe, it seems prudent that Incubators itself align to such practices promoting sustainable business development to incubatees assigned to the facility, raising the following question,

Is Invotech aligned to lean startup practices?

What is the development strategy employed at Invotech to assist customers?

This study has therefore sought to evaluate customer development at Invotech.

1.4 Aim and Objectives

The study aims to evaluate local incubator support to determine if Invotech is equipped to support and implement lean startup methodology.

The objectives of this study have been formulated in order to address the research question, and are as follows:

- To determine if Invotech is aware of lean startup methodology tools and techniques
- To determine if startups are familiar with the lean startup methodology
- To identify if startups adopt lean methodology techniques, consciously or subconsciously in their startup operations
- To determine if Invotech is positioned to offer lean startup support

1.5 Limitations of the study

The most significant limitations of the study include:

- Small sample size
- Study is confined to one geographical location, which is difficult to generalise findings
- Lean startup methodology is best suited to technology startups

1.6 Outline of the study

The study is conducted in a structured manner using a systematic approach. The study is contextualised in five chapters as illustrated in Table 1.

Table 1.1 Structure of this study

Chapter	Content
Chapter One	This chapter provides an overview of the study including the focus of the study, the problem statement and associated limitations of the study
Chapter Two	This chapter presents a literature review which evaluates lean SME development and associated risks in South Africa followed by Incubator development and support offerings. Thereafter the concept of lean manufacturing is introduced which unfolds the concept of lean startup methodology
Chapter Three	Chapter 3 details the research process undertaken in the study which includes the aims and objectives, the research method employed, the location, sampling plan and data collection methods are defined. Validity and reliability of the study is discussed in detail.

Chapter Four	The data collected is presented and analysed in Chapter 4.
Chapter Five	Chapter 5 is the concluding chapter of the study; it details the recommendations of the study and its associated limitations.

1.7 Proposed Methodology

The methodology adopted uses a case study approach where a semi structured interview will be conducted with management of Invotech and an online questionnaire using Questionpro as a platform will be administered to startups as a tool to gather data. Once the data is collected and analysed, the extent of lean startup implementation and application is measured. A detailed description of the research methodology is discussed in Chapter 3.

1.8 Conclusion

Implementation of lean startup practices are essential tools that Incubators may use to nurture and grow startups. This study is aimed at evaluating the extent of lean startup methodology employed at Invotech either consciously or subconsciously and providing recommendations for the successful roll out of lean practices at Invotech. This chapter highlights the motivation of the study including the focus behind the research, leading to the formalisation of a problem statement. The aims and objectives are also discussed. The next chapter will present a conceptual framework linking lean startup with business incubation in the context of South Africa.

CHAPTER 2: LITERATURE REVIEW

2.1 Introduction

A startup may be defined as a “human institution” designed to deliver a new product or service under conditions of extreme uncertainty (Ries, 2011). This uncertainty is caused by an environment that is constantly evolving. According to Ries (2011) interventions need to be tailored to those that empower entrepreneurs to be agile and development orientated in an uncertain and complex environment. Therefore in order for startups to remain viable and sustainable, it is imperative that startups deliver products that satisfy consumer needs and meet expectations whilst keeping overhead costs at a minimum.

This literature review evaluates the uncertain and complex environment that startups operate in followed by an introduction of support mechanisms currently available. An assessment of lean principles will then be presented followed by the introduction of lean startup methodology and its relevance to building successful and sustainable startups.

2.2 SME Climate

2.2.1 Obstacles to growth

A study conducted by Olawale and Garwe (2010) investigates the obstacles to growth by new SMEs in South Africa. According to the study, SMEs are seen as a significant component to resolving South Africa’s development issues; however South Africa has the highest failure rate in the world with respect to SME development. The study identifies thirty variables as obstacles to SME growth in South Africa, comprised of internal and external factors. The biggest obstacle is finance (internal), followed by economics (external), market (external), management (internal) and infrastructure (external). Creating and sustaining new SMEs is a vital component to South Africa’s economic prosperity and a lack thereof, can lead to economic stagnation. The growing number of job seekers in South Africa followed by the failure of both the formal and public sector to absorb these individuals requires a focused look on entrepreneurship and new firm creation to contribute to economic growth. Though, in percentage terms SMEs exhibit higher growth rates, most small firms do not grow as they are established. According to Beck and Demirguc-Kunt (2006), in order for new SMEs to grow, it is

important to reinforce both the internal and external business environment. Changes in either environment may have either a negative or positive effect on the sustainability of SMEs in Africa. According to the study, finance, crime and volatility in the markets substantially inhibit growth of new SMEs whilst variables related to infrastructure such as poor roads, lack of utilities and poor telecommunications are lowly ranked growth inhibitors.

2.2.2 SME financial support

Olawale and Odeyemi (2010) evaluate the determinants of credit approval for new SMEs. According to the study equity and debt are the two primary sources of external finance for new SMEs. According to the South African Venture Capital Association (2008), equity in the form of the stock exchange or venture capital is not available for new SMEs forcing them to seek bank loans, overdrafts and supplier credit. The dependence of SMEs on debt finance does not translate to easy access to these funds since commercial banks are reluctant to disperse finance to new SMEs with only as little as 2% of SMEs being granted access to bank loans (FinMark Trust, 2006). Business startup assets should be financed with internal funds allowing the business to reach a break even cash flow state. The choice of debt taken lies in the firm's ability to sustain long term growth with debt financing without jeopardizing its well-being. The determinants of access to debt are managerial competencies, collateral, business information, networking and location. The study evaluated managerial competencies that lead to personal effectiveness as a set of skills, behaviour, attitude and high knowledge base. Using assets as collateral is required to reduce moral hazard problems by adding a potential liability to borrowers if they do not make a best effort approach to business. Barbosa & Moraes, (2004) proposed that those enterprises who invest in tangible assets have the ability to invoke financial leverage by negotiating lower interest rates on debt financing. Collateral can therefore be seen as a critical component to debt financing. Business information in the form of an astute business plan are regarded as essential documents that need to be developed by SMEs to be distributed to financial institutions for lending purposes. According to the study, financial information provided by SMEs are analysed for both present and future performance by lending institutions which in turn is used as an indicator of the borrower's ability to service the debt.

2.2.2.1 Networking

Ngoc and Nguyen (2009) identified networking as a tool that SMEs can use to solidify legitimacy issues that banks may have with respect to SMEs, in turn allowing SMEs to access bank loans. With respect to location, SMEs located in metropolitan areas have a higher success rate than those in rural areas, due to crime in rural areas. Specificity with regards to location is also regarded as a fundamental determinant in accessing finance. The outcome of the study emphasises the need of SMEs to meet the minimum determinants required for debt financing to secure much needed loans.

2.2.3 SME Risk Management

The need for SMEs to anticipate risk and reduce its occurrence is paramount to achieve organisational goals. Instituting a structured approach to organisational risk management within SMEs gives rise to benefits such as cost reduction and enterprise alignment towards the organisations mission and objectives.

Smit and Watkins (2012) evaluate SMEs according to their ability to absorb unskilled labour and to nurture and develop entrepreneurial skills. According to the study, the vision of reducing the over-management of risks and organisational alignment can be realised by embedding a structured approach to enterprise risk management within SMEs. SMEs have the potential to prosper, having the ability to adapt to new working regimes, relative proximity to customers and the ability to take risks, however many SMEs are vulnerable to external shocks (Berry, 2002; Laforet and Tann, 2006). SMEs are prone to experience difficulties in absorbing and coping with challenges and obstacles, these difficulties include:

- i. Economic based problems
- ii. Enterprise related problems
- iii. Industry related problems

According to Leopoulos (2006), difficulties catalyse the need to develop an inherent ability to deal with risks faced by the associated enterprise. The potential risk of catastrophic consequences if SMEs are ill prepared (regarding risk identification) is high,

unless entrepreneurs are conversant with risk identification and analysis from a wide range of sources (Schultz, 2001).

2.2.4 Human Capital

According to McGrath and King (1996) the fundamental element that has a positive impact on startup growth is human capital. Confirmation of human capital as a critical success factor may be found in the study by Rogerson (2001) which indicates that successful entrepreneurs have to be educated and trained. According to Brink, Cant and Ligthelm (2003), a lack of both technical and managerial skills impedes enterprise growth and expansion.

2.3 Business Development Services

Business development services (BDS) are defined as both non-financial services and products offered to entrepreneurs at various stages of their business needs. BDS are primarily aimed at skills transfer and support.

Mazanai and Olawale, (2011) evaluate the effectiveness of BDS in South Africa. According to the study, government support and intervention in the SME sector could help alleviate poverty and create employment in South Africa. The definition of BDS by the Committee of Donor Agencies for Small Enterprise Development (2001), identifies BDS as services that improve performance of an enterprise, its accessibility to markets, and its ability to compete. Through the Department of Trade and Industries (DTI), the South African government has established a number of public institutions that are equipped to assist SMEs with support and funding, being SEDA, Industrial Development Corporation (IDC), Umsobomvu Youth Fund (UYF), South African Micro-Finance Fund (SAMAF), National Empowerment Fund (NEF), South African Women Entrepreneurs' Network (SAWEN), and Technology for women in business (TWIB), despite having a plethora of institutions, SMEs still experience difficulties in receiving such support and assistance. According to Hitchins (2002), government intervention has been ineffective due to lack of sound market analysis and ignorance at trying to address failures.

Mazanai and Olawale (2011) recommend that both the private and governmental sectors work hand in hand with SMEs to ensure adequate and effective access to BDS,

finance and its distribution. The essential role that BDS initiatives play in the economy needs to translate into successful SME development.

2.4 Incubators

Incubators can be defined as an organization designed to accelerate the growth and success of startup companies through an array of business support resources and services that include but not limited to physical space, capital, coaching, common services, and networking connections. A study conducted by Lesáková (2012), evaluate the role of incubator support on startups by describing incubators as initiatives designed to accelerate growth and development of startups through a range of business support resources and services, managed by incubator support personnel. Incubator programs aim to bridge the gap often experienced by entrepreneurs by providing a platform or space to launch a business proposition or idea. Different types of incubators exist, varying in both organisational structure and service offering. Incubators that assist startups with office space, provide assistance with administration services and business advice are termed 'Classical incubators' whilst technological incubators provide support for technological startups and are often aligned with universities, research institutions and scientific platforms. Common incubator support services include:

- Assistance with business basics
- Networking
- Business plan and modelling
- Marketing assistance
- Taxation and financial management
- Access to grants
- Low interest loans and seed funds
- Access to venture capitalists
- Assistance with presentation skills and pitching
- Links to training and educational programmes
- Links to government contacts and strategic partners
- Patent support

- Business mentorship and commercialisation assistance

Though many incubators offer clients office space and shared administrative responsibilities, the primary function of incubator support programmes reside with the services it provides to startup companies. Many incubators have selection criteria that grant startups admission once pre-requisites have been met. General acceptance criteria amongst incubators revolves around feasible business ideas and a workable business plan. Startups are charged for facilities and resources supplied by incubators, however these costs are off-set by government grants and seed funds allocated to startups, fees charged by incubators though are substantially lower than the market rates.

2.4.1 Implementation challenges of Incubation models

Obaji, Senin and Richards (2012) identify the challenges faced by the Nigerian government in implementing SME incubation models. The study describes business incubators as mechanisms that add value to both firms and incubatees. According to the study there are three main macroeconomic objectives that incubation programmes aim to achieve, which are, job creation, economic development and international networking. Technology business incubation schemes are implemented by most developed and industrialised nations such that an accelerated approach to the establishment of innovative knowledge based businesses can be achieved. Adaption problems in conjunction with incoherent financial support coupled with inefficient structural administration dealings and inconsistent government policies hinder both growth and sustainability of SMEs assigned to incubators. Stefanovic, Devedzic and Eric (2008) elude to government involvement being linked to incubator growth, since in developing countries both incubator establishment and funding is solely a government prerogative, however this is not true in South Africa.

2.4.2 Incubator success factors

Schaikwyk and Dubihlela (2014), identify 11 potential success factors for business incubators, which are:

- I. Access to science and technology expertise and facilities

- II. Comprehensive business plan
- III. Stringent selection criteria
- IV. Available funding
- V. Quality of entrepreneurs
- VI. Stakeholder support
- VII. Supportive government policies
- VIII. Competitive and motivated management
- IX. Financial sustainability
- X. Experienced advisory board
- XI. Networking

According to the study, incubators need to be aligned to deliver key objectives aimed at building startups, being, economic growth, sustainable employment, technological innovation and technology transfer. Technology stations include, research and development, implementation of new technologies, technology transfer, troubleshooting, quality advisory service, product development, simulations, analytical testing and human resources.

2.4.3 Rapid Incubation

Rapid Incubation for small enterprise establishment is defined as an innovative process aimed at incubating and transforming ordinary entrepreneurs with a limited educational background into a budding entrepreneur in an accelerated timeframe (Dey, 2012).

According to Dey (2012), the main goal of an incubator is to produce successful startups with an array of targeted resources and services. On receiving such support, startups have the potential to create jobs, develop technology for import substitution, commercialize new technologies, which in turn strengthens both local and national economies. Incubators are defined according to their product or service offering such as contributing to diversification of rural economies, creating employment, increasing wealth and technology transfer. Startups are viewed as being at the forefront of developing new and innovative technologies, in turn creating products and services that improve the quality of lives in communities around the world. Major components of the rapid incubation process are

- Entrepreneur skill development
- Project/product selection
- Opportunity guidance
- Hands-on practical training on working projects/training modules
- Facilitation of funds through government initiated funding and from banks
- Facilitation on setting up an enterprise
- Support services to run small business

Technology used in this incubation process accrues minimal cost and is easy to maintain. Startups can quickly learn to adapt and obtain support services through an emulated environment of an Incubator.

2.5 The concept of 'Lean'

Lean startup methodology is based on the concept of lean manufacturing. The definition of 'lean' as a strategic option for achieving significant improvement in obtaining deliverables and performance, through eliminating unnecessary waste of resources and time in the entire business process, is a view taken by Neha, Singh, Simran, and Pramod (2013).

Overproduction coupled with excess inventory and defects are examples of waste elements that are mitigated in the lean approach. According to Neha *et al* (2013) there are 5 steps involved in the lean approach, which are, specifying value, identifying the value stream, creating flow, the concept of pull and the hunt for perfection, each step employed can be used as a universal approach for any company in any industry adopting the lean way. Neha *et al* (2013) identifies logistics as being the backbone in the lean approach, especially with the Just in time (JIT) mechanism of managing raw materials, and stock levels of final product.

In a separate study conducted by Agus & Iteng (2013) lean is defined as a manufacturing system focussed on two specific issues, which is the elimination of waste and respect for people. The study supports the standpoint that lean requires minimal human intervention, reduced spatial requirements, limited investment models, engineering hours and time required to develop new products. The study explores the link between lean production and business performance with the primary aim of

highlighting the tangible benefits that are realised from a business perspective in adopting the lean approach in industry. According to Agus and Iteng (2013), a qualitative analysis would reveal JIT systems coupled with technology and innovation (TECH) as being the two fundamental indicators of business performance.

In a similar study conducted by Nordin, Deros, and Wahab (2010) the lean approach is defined as a smooth and high quality approach designed to produce finished goods relating to customer demand in the quality sought-for with no waste. Nordin *et al* (2010) identified and emphasised the formidable challenges associated with the lean approach and the potential effects of an unsuccessful implementation based on business performance. The study highlights the myriad of tools available for adopting the lean approach. Joshi, Patil, Naik and Kharade (2013) sums up lean as simply a reduction of waste. The study adopts a similar standpoint in relation to reducing activities that inflate costs, lead times, inventory management, instituting planned preventive maintenance schedules, total quality systems, pull mechanisms, flexible work forces and production facilities. According to Joshi *et al* (2013) specific areas that can be potentially improved need to be efficiently evaluated and selection of appropriate lean techniques need to be cross referenced to ensure that the best possible solution is employed to adopt the best fit case. Lean approaches need not be applied to the entire business process but key segments inherent in the process can be manipulated to bring about lean principles. The study reveals that by adopting specific lean techniques to specific processes, the benefits of achieving minimal waste, high throughput and reduced costs can be realised. Chakraborttya and Paul (2011) refer to lean as a term to describe a system that produces exactly what the customer wants, when they want it, with minimal waste.

2.6 Lean startup methodology

The survival of startups are essential for both economic viability and sustainability, the rising costs of product development coupled with poor customer reception has led to the concept of lean being applied to startup processes. Lean techniques are essential tools applied by large corporation's around the world to streamline business processes whilst maximising productivity and customer requirements. Aligning the concept of lean with startup growth is a methodology that is creating and building successful startups around

the world. Moogk (2012), describes the concept of lean startup as a methodology aligned to enhancing developmental efficiencies and accelerating product delivery to the target market with intentions of gaining the first mover advantage.

Adopting a lean approach to startups affords young entrepreneurs with an opportunity to accelerate the product development phase with the intention of continuing on a predetermined path or to pivot and change direction (Ries, 2011). Eric Ries, author of the lean startup, defines a startup as an enterprise operating under conditions of uncertainty, determined and dedicated to create something new. This ideology resonates with startups brainstorming in a garage or executives in a Fortune 500 company strategizing in the boardroom, each aimed at carving a path to ensure viable propositions lead to sustainable business ventures. The ability to effectively leverage human creativity while being capital efficient are characteristics that embody the lean startup approach.

2.6.1 Concepts associated with lean startup

Lean startup methodology relies on validated learning, rapid scientific experimentation, shorter product development life cycles, waste minimisation, and most importantly; understanding what customers really want. Adopting the lean startup approach allows entrepreneurs to pivot or change direction with ease, based on customer needs and measuring these changes based on customer responses (Ries, 2011). The lean startup approach drives a wedge between creating elaborate business plans and offers entrepreneurs a method to test their vision continuously allowing them to pivot or remain on their current path if needed.

2.6.1.1 Validated learning

The concept of validated learning follows a rigorous method for demonstrating progress under conditions of extreme uncertainty. Validated learning aims to empirically demonstrate a team's capability to uncover absolute truths about a startups present and future business prospects, providing accurate real time results as opposed to market forecasting and other conventional techniques. Determining the right type of questions to address leads to a strategic opportunity that startups need to consider.

2.6.1.2 Minimum Viable Product (MVP)

Startups are encouraged to formulate a minimum viable product (MVP). The MVP is defined as a version of the product that enables a complete turn of the build-measure-learn-feedback loop (Fig 2.1) with minimum effort coupled with the least amount of development time (Ries, 2011). A MVP accelerates the learning process of entrepreneurs by delivering product to the market as soon as possible. Entrepreneurs are able to exploit the fastest way to get through the build-measure-learn-feedback loop with the least amount of effort such that maximum learning can be extracted per exercise.

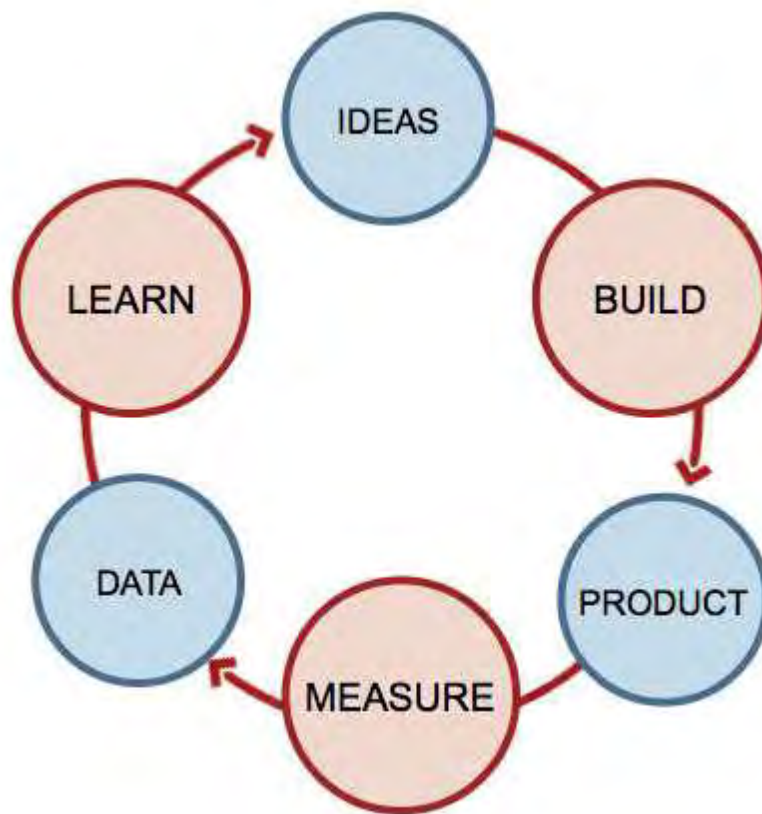


Figure 2.1 Build-Measure-Learn- Feedback Loop

Source: Adapted from Ries, 2011. The Lean start-up

MVP's are specifically designed to answer both product design and technical questions, with the fundamental objective aligned at testing a business hypothesis. Entrepreneurs have the ability to pivot if MVP's are received negatively. Features, processes and

efforts that fail to contribute to a startups performance need to be excluded during construction of a MVP. Low quality MVP's have the potential of leading to high quality products.

According to Moogk (2012), emphasis is placed on waste reduction in terms of time and resources by releasing a minimum viable product (MVP) as soon as possible. Startups need to utilise MVP's to test and evaluate growth hypotheses by engaging target customers using appropriate metrics. The fundamental concept behind lean startup methodology is that actual product of an early stage startup consists of a number of experiments that contribute to reducing risk and uncertainty, of which progress can be measured by learning gained from these experiments. The objectives of attaining visionary goals and delivering the right product to the market depend on the startups capacity for accelerated learning. It is essential for startups to validate its value as soon as possible such that it is able to construct a version of its product that has the potential to demonstrate its value proposition. Startups need to use MVP's to confirm or refute both their value and growth hypotheses. An MVP approach should represent two functionalities, one that may need less time to develop and the other should include enough development capacity to test its traction in the market. Although a startups product offering may possess an array of features, it is essential that these features are excluded from the MVP, such that customers are offered a base product that they are able to interact with as soon as possible. This will ensure that entrepreneurs will essentially be able to evaluate actual customer needs based on feedback and will be able to test each feature on an experimental basis to determine impact on the customer, often called baseline data collection. Data building on baseline results should be collected as each product feature is tested or each customer request is adhered to. The metrics designed to evaluate the effects of MVPs are critical and should essentially measure real business impact without the use of vanity metrics.

2.6.1.3 Pivot

The need to pivot stems from lack of progress after changes have been made and tested. When a startup undergoes a pivot, the process of establishing a baseline and

ideal resumes from start. A successful pivot shows signs of progress in comparison to the previous business model.

2.6.1.4 Innovative Accounting

The concept of innovative accounting stems from the need for startups to possess a disciplined, systematic approach to evaluate actual progress and success in terms of validated learning. Innovative accounting contrasts traditional accounting in that it is designed specifically for startups turning leap of faith assumptions into an astute financial model. Innovative accounting attributes success in three steps:

1. Establish startup current status using actual data
2. Startups to accelerate strategy from baseline model to ideal status
3. Once startup achieves ideal, the decision to preserve or pivot needs to be taken.

The innovative accounting model affords startups the ability to make an informed decision either to pivot or preserve.

2.6.1.5 Value adding activities

Startups adopting a lean approach need to firstly identify value adding activities in conjunction with activities that lead to waste. On completion of the exercise, use of lean techniques to reduce waste with a proportional increase in value added activities need to be implemented. It is important that the distinction between value and validated learning is understood, in that validated learning are the pillars of building sustainable startups whilst value add centres around product offering or services rendered.

2.6.1.6 Engines of Growth

A goal etched in the mind of entrepreneurs throughout the lifecycle of a startup is, growth. Customers are able to drive sustainable growth in one of four ways, either by word of mouth, in that satisfied customers are able to translate and transfer positive responses to peers and colleagues on product offerings; as side effects of product usage, in terms of fashion and status; thirdly, through funded advertising, and lastly through repeat purchase or use. The term 'engines of growth' are defined as sources of

growth that drive feedback loops (Ries, 2011). The higher the revenue coupled with reduced marginal cost leads to an accelerated growth curve, and finally through repeat purchase or use. Ries (2011) describe engines of growth where startups are able to choose a specific path and evaluate each aspect of development. The higher the acceleration of the loop, the faster the startup will grow. The application of the engine of growth loop is not confined to just a single unit application rather, more than one engine of growth can be used at any given time. However, according to Ries (2011), successful startups employ just one engine of growth. Engines of growth afford startups the opportunity to focus on specific aspects of day to day operations by issuing a finite amount of metrics on which to evaluate performance. The engine of growth selected, mentality directs startups to undertake big experiments to derive greatest benefit from validated learning in turn assisting startups to focus on important metrics.

2.6.1.6.1 Sticky engine of growth

The sticky engine of growth is a term attributed to companies that pay attention to their attrition or churn rates. The attrition rate or churn rate is defined as the number of customers that switch to similar counter products in any period (Ries, 2011). The sticky engine of growth is governed by specific rules in that growth is dependent on new customer acquisition exceeding the churn rate.

2.6.1.6.2 Viral engine of growth

A contrasting growth module, is the viral engine of growth, which as its name suggests is based on an individual to individual transmission model of growth (Ries, 2011). Customers acting unintentionally create awareness of product offering, functioning as an abstract marketing tool. Growth is automatic which occurs as a side effect of customers using the product.

2.6.2 Product/Market fit

The point at which startups find customers that resonate with their product offering is called, product/market fit (Ries, 2011). In order to accelerate the product/market fit scenario startups require processes that provide a natural feedback loop. The use of adaptive processes enforce the need for startups to firstly slow down and invest in

solutions that prevent time wastage, in turn allowing a startup to speed up value added activities by focussing less on non-value add practices. Adaptive processes can be derailed by technical problems encountered by startups.

2.6.3. Sandbox of Innovation

Commoditization to any startup can be catastrophic, product commoditization can be averted by line extensions, incremental upgrades and new marketing techniques, further challenging startups to formulate a mechanism that empowers innovative teams (Ries, 2011). The sandbox of innovation (Fig 2.2) is a mechanism that promotes rapid iteration. Startups are able to benefit from the sandbox of innovation in that the ability to see products on an end to end basis by preparing small batches, allows startups to make cheap mistakes quickly and start learning, benefitting extensively from feedback from both peers and customers. The sandbox of innovation may contain the new innovation without constraining the startup team. Customers in the sandbox are considered real entities and the innovation teams are encouraged to build a long term relationship with the customers. The need to have a team leader and practise cross functional principles are important lessons in this technique. The ability to build marketable products in the sandbox for innovation without prior approval is tested, and reported based on both success and failure using specified metrics and innovative accounting. The eventuality of the sandbox growing with time is inevitable, the decision to move the innovative team out of the sandbox into company routine is a decision that the startup needs to evaluate else the scope of the sandbox can be increased. Sandboxes are designed to grow startups with imminent failure expected on inception coupled with the benefit of learning (Ries, 2011). Teams in the sandbox are afforded the opportunity to grow by constantly testing and experimenting and evaluating these results using metrics that are free from vanity and use of innovative accounting. Once startups have reached the end point where all mistakes and maximum learning has been achieved, the product is able to be commercialised.

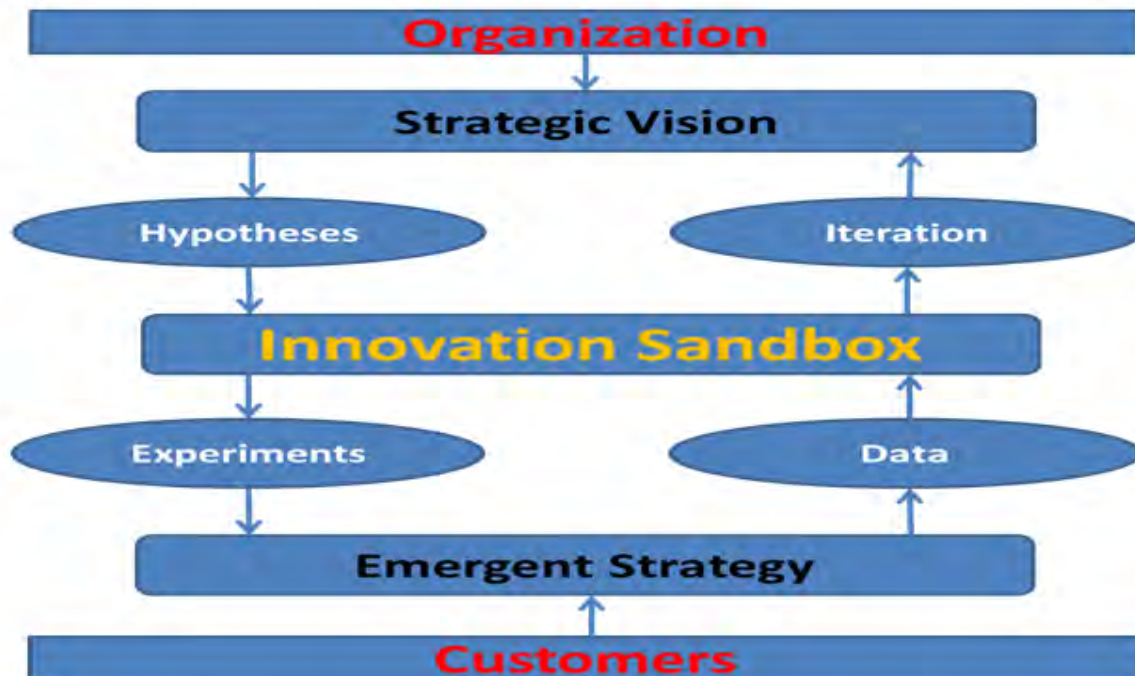


Figure 2.2 Sandbox of innovation

Source: Adapted from Ries, 2011. The Lean Start-up

2.6.4 Attributes and Constraints

Three fundamental attributes are required by startups being, both secure and scarce resources, independent ownership of the business which allows entrepreneurs to test and evaluate new strategies and finally a stake in the eventual outcome of the business (Ries, 2011). Knowledge of who the innovator is, is essential such that credit may be bestowed upon the one that conceptualised and brought the product to life, in the event that the proposition pans out to be a successful endeavour. Startup success is pinned on running efficient and effective business processes. Budget is an important constraint that startups need to effectively manage, in that a high budget is as great a risk as a budget that is too low. Startups need to maintain efficient operations, which require the ability to have to rely on lower capital which needs to be secure and free from any mismanagement whatsoever. Incorporated in the lean approach is the ability for teams to operate under complete autonomy during both the development and marketing stages within an agreed upon mandate, the need to conceive and execute experimental designs has to be actioned with a limited amount of approvals such that an accelerated

approach to value adding activities is enhanced. The ability to construct and distribute actual products and services needs to be accepted. However, the handover and approval process inhibit both learning and accountability by constraining the build-measure-learn feedback loop (Ries, 2011). The lack of ability to test and experiment on products and services translates to innovators dilemma, whereby post high profits and product success, the ever changing market place poses the ever present risk of business collapse.

2.7 Agile Development

A contrasting methodology to lean startup is, agile development. Agile development (Fig 2.3) is a function of elimination of wasted time and resources by developing products iteratively and incrementally. Startup growth is constrained by five factors namely,

- The high cost of acquiring the first customer
- The added higher cost of getting the product wrong
- Extensive technology development cycles
- The limited number of entrepreneurs with an appetite for risk
- The structure of the venture capital industry and the concentration of expertise in developing startups.

When combined with the concept of lean startup methodology, the first two constraints are reduced by assisting startups with product launches that customers would actually use, product release is relatively quicker than traditional techniques.

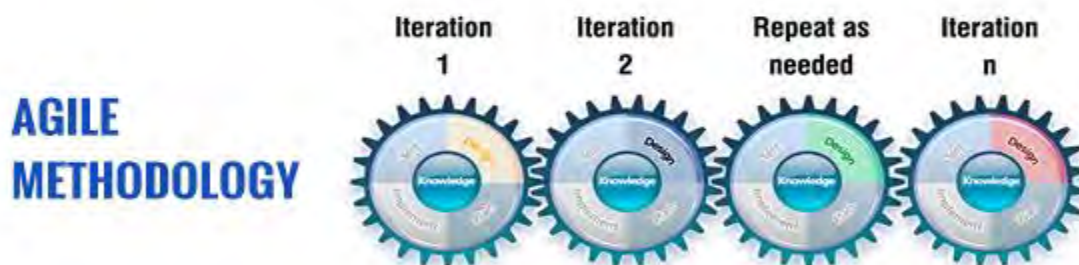


Fig 2.3 Agile Methodology

Source:<http://webapprater.com/articles/agile-development-must-know-main-principles.html>

2.8 Business Plans

Blank (2013), considered one of the founding members of the lean startup methodology contrasts conventional mentality with lean mentality. The conventional way of building a startup requires a business plan, described as a static document with the following characteristics in that it describes the size of the opportunity, the problem to be solved, coupled with the solution supplied by the startup. The business plan normally includes a five year projected forecast for income, profits and cash flow. A business plan is essentially seen as a research exercise written in isolation before any product development. Blank (2013) sums up business plans as rarely surviving first contact with customers, with only venture capitalists requiring five year plans to forecast complete unknowns, considered fictitious assumptions, the realisation that startups are not smaller versions of large companies which unfold in accordance with master plans, needs to be understood. The fundamental difference between larger companies and startups is that existing companies execute a business model whilst startups are in search of one. Blank (2013) defines lean startup as a temporary organisation designed to search for both a repeatable and scalable business model. The lean approach has three key principles, firstly there is no need for a business plan, instead entrepreneurs need to summarise hypotheses in a framework called a business model canvas, which is essentially a diagram of how a company creates values for both itself and customers, secondly, startups need to focus on customer development to test their hypotheses by using the “get out of the building “ approach which entails actually going out and questioning potential customers, users and partners for feedback on all aspects of the business model emphasis being placed on both nimbleness and speed. Thirdly, startups need to practise agile development, which goes hand in hand with customer development. Startups need to rapidly assemble minimum viable products and eliciting customer feedback immediately.

2.9 Development of a conceptual framework

A consolidation of the theories and empirical studies in the literature review results in the formulation of the conceptual framework for lean startup methodology as illustrated in Figure 2.4.

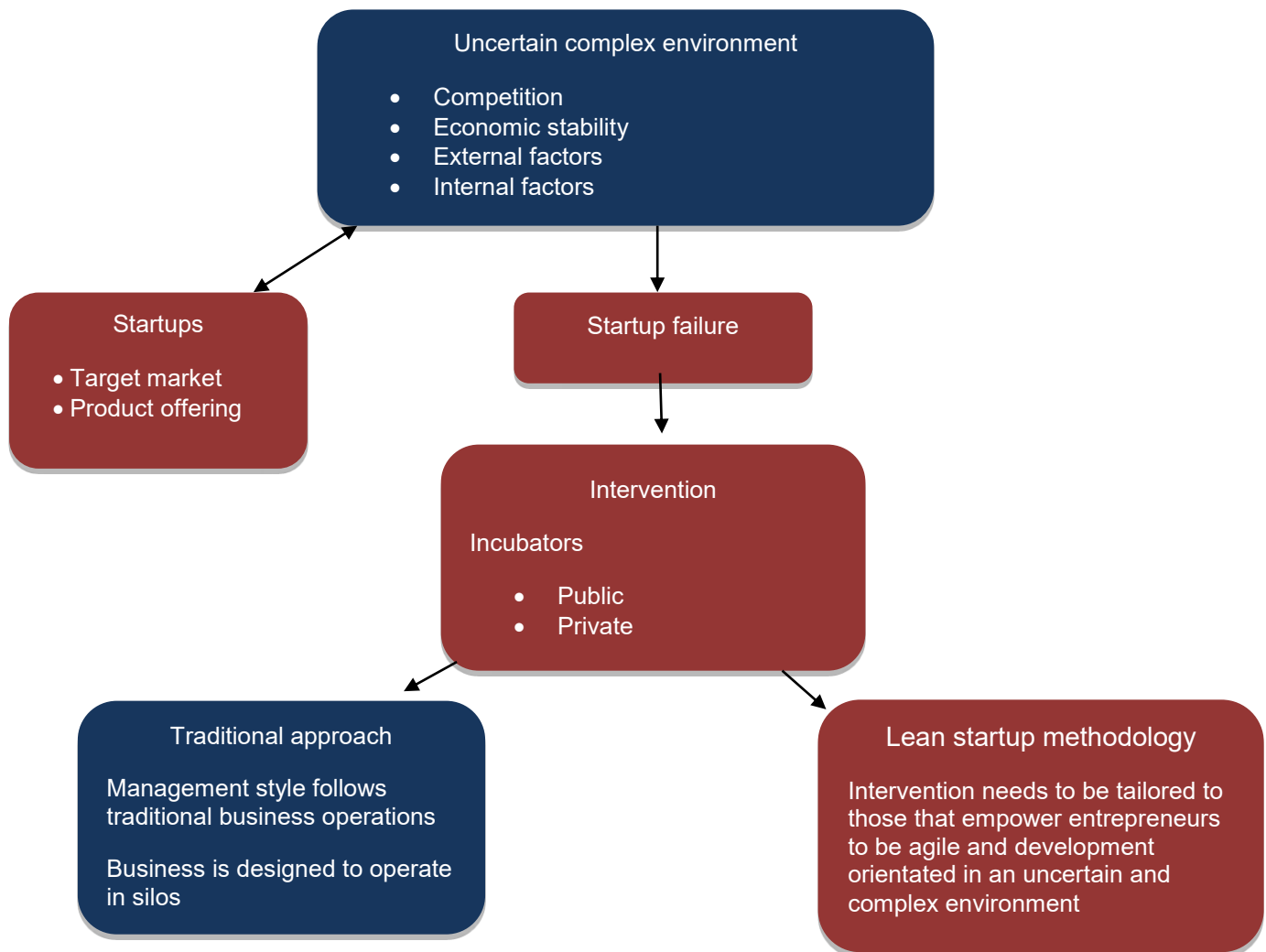


Figure 2.4 Conceptual Framework

2.10 Conclusion

An uncertain environment and fluctuating economy have prompted the need for a startup to re-evaluate its strategic goals and objectives in order to remain sustainable. Accelerating the development of products with minimal costs are key deliverables that startups need to satisfy in order to gain insight into consumer needs and expectations.

This chapter introduced the current SME climate with respect to obstacles to growth. After evaluating factors that inhibit growth, the role of incubation services was introduced. Incubators are mechanisms that are strategically positioned to nurture startups by offering specific services tailored to promote startup growth. The concept of

lean startup methodology was later introduced highlighting mechanisms that startups need to employ to remain competitive and viable.

The literature presented highlighted the need for the incorporation of lean practices by startups, while this methodology is recognised globally, its relevance in South Africa, especially Invotech technology incubator needs to be evaluated. A plethora of techniques fall under the umbrella of lean startup methodology and implementation of these techniques may ensure successful creation of startups. Insightful research is required to determine Invotech Incubator service offering with respect to lean startup practices, the methodology will be discussed in the next chapter.

CHAPTER 3: RESEARCH METHODOLOGY

3.1 Introduction

The purpose of this chapter is to discuss the research methods employed in conducting this study. This chapter includes a synopsis of the research design, including sampling, data acquisition and analysis of the results obtained.

3.2 Aim and Objectives

The application of lean startup methodology is a technique applied to the development of new ventures around the globe to reduce operating expenses and expedite the process of delivering product to consumers. The methodology affords entrepreneurs the ability to test their product often called a minimum viable product (MVP) as early as possible. The purpose of lean startup methodology is to determine market needs with intentions of mitigating risks that accompany new product development, such as poor market reception, poor sales and the most important commodity, time lost. By developing a MVP, a startup has the ability to evaluate ones product with actual feedback from consumers (market responses). The startup thus has the opportunity to change direction or pivot the business model (in the language of lean startup methodology) in response to early market response without a substantial monetary loss.

The study aims to evaluate incubator support to determine if Invotech is equipped to support and implement lean startup methodology. This was achieved through an evaluation of management views on lean startup practices coupled with incubatee understanding and their exposure to the principles and/or practices of lean startup methodology.

The rationale of the study is underpinned by the high failure rate of startups in South Africa (Figure 3.1)

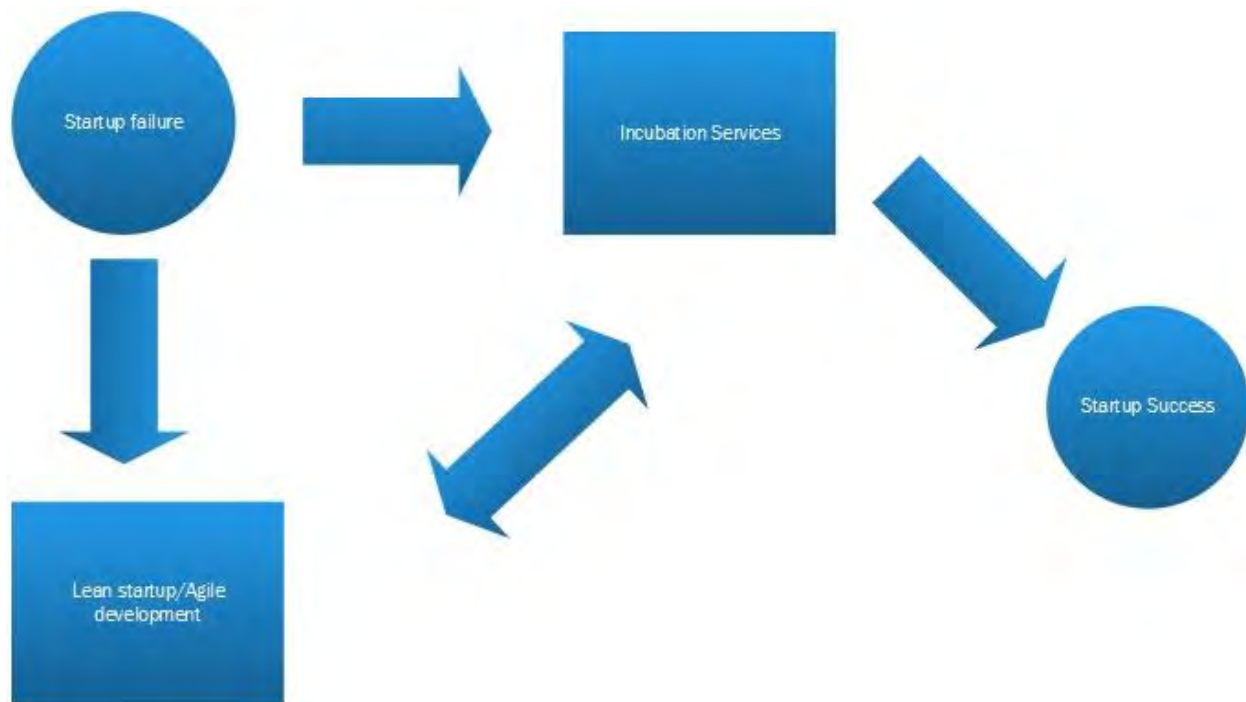


Figure 3.1 Rationale for the study

- Incubation services are intervention mechanisms that promote startup growth
- Lean startup and agile methodologies have been developed to mitigate failure of high tech startups
- The application of lean startup and agile methodologies in incubators/accelerators is gaining momentum

This study therefore examines tech startups in Durban, particularly, Invotech Incubator

Objectives

- To determine if Invotech is aware of lean startup methodology tools and techniques
- To determine if startups are aware of lean startup methodology
- To identify if startups adopt lean methodology techniques, consciously or subconsciously in their startup operations
- To determine if Invotech is positioned to offer lean startup support

3.3 Participants and location of Study

The research study was conducted at Invotech incubator situated at the Durban University of Technology (DUT) in Kwa-Zulu Natal, Durban (Fig 3.2)

The participants involved in the study fall into two categories:

- 1) Managers of the incubation facility
- 2) All startups assigned to Invotech

The selection of Invotech Incubator was primarily based on geographical positioning and market presence with respect to publicity and establishment. Invotech is an Innovation and technology incubator, funded by SEDA. Invotech provides business support to nurture and engineer businesses in the innovation and technology environment. Invotech currently implements models to support startup businesses by providing business mentorship and business management skills. All interventions are based on international best practice. Invotech primarily supports technology startups who have innovative ideas and/ or service offerings.



Figure 3.2 Durban Metropolitan Area

Source: PamGolding, 2015, *Map of Durban Metropolitan* [online] Available at :<
<http://www.pamgolding.co.za/map-search/south-africa/kwazulu-natal/durban-metropolitan/map.aspx>> [Accessed 10 July 2015]

3.4 Broad understanding of research

Research refers to the pursuit of knowledge with some collectively defining research as a scientific and systematic search for pertinent information on a specific topic. According to Redman and Mory (1923) research is a systematic effort to gain new knowledge.

Clifford Woody defines research as a process of defining and redefining problems, formulating hypothesis, collection, collation, organisation and evaluation of data, making deductions and reaching conclusions and finally testing the conclusions such that its relation to the hypothesis can be determined (Kothari, 2008). D. Slesinger and Stephenson define research as manipulation of data, concepts or symbols with the intention of generalising to extend, correct or verify knowledge whether it aids in assimilation of theory or the practice of art (Kothari, 2008). According to the study, research is viewed essentially as an investigation into processes. Research can thus be seen as an original contribution to an existing body of knowledge pursuing truth with the aid of study, observation, coupled with comparison and experiment.

3.4.1 Research Methodology

According to Kothari (2008), research methodology is a tool used to systematically solve a research problem which can be interpreted as a scientific way of conducting research. Research methodology encompasses various steps that are adopted by researchers in studying research problems in parallel with logic associated with the study. Research methodology can be described as a series of procedures and techniques used to conduct a study. The step wise hierarchy of research methodology involves, the identification of problems, review of relevant literature, formulating an hypothesis coupled with a corresponding procedure to test the hypothesis, a tool for measurement, data collection and analysis and finally the interpretation of results and drawing conclusions (Kothari, 2008). Thus, it seems that research design and methodology have the same meaning i.e. mapping strategy of research.



Figure 3.3 The research process

Source: Adapted from Hassan, 2015

Methodology can be seen as the science of arrangement. By placing emphasis on arrangement, the term methodology derives substance from a classically controlled experiment which permeates rightly.

3.5 Research design

According to Selltitz, Jahoda, Deutsch and Cook, (1959), the arrangement of specific conditions for collection and analysis of data in method that aims to combine relevance to the research purpose and economy in procedure is termed, a research design. Kothari (2008), defines research design as the conceptual structure within which research is conducted, constituting the framework for collection, measurement and analysis of data.

A number of research designs exist which can be categorised as

1. Exploratory or formulative research studies, which aims to gain familiarity with a specified phenomenon or to provide new insights into it
2. Descriptive studies, of which the objective is to accurately portray the characteristics of a specific individual, situation or group.
3. Diagnostic research studies, which determines the frequency of an occurrence of a study variable or its relation to something else.
4. Hypothesis testing, to test the causal relationship between variables

3.6. Case study approach

According to Sekaran and Bougie (2010), there are three approaches or methods that can be used for data collection, these are,

- qualitative
- quantitative
- mixed methods

A case study follows a qualitative method approach, based on complete and thorough observation of a social unit (a person, a family, an institution, a cultural group or the entire community). Case study methodology focusses on depth rather than breadth, where focus is placed on the complete analysis of a limited number of trials or circumstances and their interrelations. A case study is therefore described as an intensive examination of the particular component under consideration. The aim of the case study method is to identify those factors that relate to the behaviour-patterns of the given component as an integrated entirety. According to Odum and Jocher (1929), "The case study method is a technique by which individual factors whether it be an institution or just an episode in the life of an individual or a group is analysed in its relationship to any other in the group." Accordingly, an exhaustive study of a person (as to what he says and does, or what he thinks or expects, or wants to do) or unit is called a life or case history. Burgess (1949) has termed this "the social microscope" for the case study method. The case study method as described by Young (1960) states "a comprehensive study of a social unit be that unit a person, a group, a social institution, a district or a community."

Common features of case study include (Gomm, Hammersley, and Foster, 2000, Yin 2009):

- In-depth study of a small number of cases, often longitudinally (prospectively or retrospectively).
- Data collection and analysis are about a large number of features of each case.
- Cases are studied in their real-life context; understanding how the case influences and is influenced by its context is often of central interest to case researchers.
- Cases are naturally occurring, they are not manipulated as in an experiment.
- The use of multiple sources of data including interviews, observation, archival documents and even physical artefacts to allow triangulation of findings.

3.6.1 Characteristics

Significant characteristics of the case study method are:

1. The researcher may take a single social unit or more units for the purpose of the study; he can also take a situation for study of the same comprehensively.
2. The selected unit is thoroughly studied i.e., it is studied in detail. Usually, the study extends over a period of time to discover and learn the natural history of the unit and hence, gather sufficient information for drawing correct inferences.
3. A complete study of the social unit is conducted covering every aspect.
4. Under this method the approach is qualitative and not quantitative. Every likely effort is made to amass information covering each and every aspect of life and straightforward quantitative information is not gathered. Case study serves to intensify awareness to provide a clear insight into life.
5. Under case study method, an attempt into the mutual inter-relationship of contributory factors is made.
6. Using case study method, an indirect and abstract approach is not applied, rather the behaviour pattern of the target unit is directly studied.
7. This method results in pleasing hypotheses in addition to the data which may be beneficial in testing them; thus it facilitates the common information to get deeper and richer.

3.6.2 Assumptions

The case study method is based on several important assumptions, listed as follows:

1. The assumption of consistency in basic human nature despite the fact that human behaviour can differ according to circumstances.
2. The assumption of examining the innate history of the concerned unit.
3. The assumption of complete investigation of the unit concerned.

3.6.3 Major phases involved

Major phases involved in case study are as follows:

1. Determination and recognition of the condition of the event to be investigated or the unit of interest.
2. Collection of information, assessment and account of the given event.
3. Identification and diagnosis of contributory factors as a foundation for developmental or remedial treatment.

3.6.4 Advantages

There are a number of advantages of the case study method based on the previous features describe above. The important advantages are mentioned below.

1. Serving as a comprehensive inspection of a social unit, the case study method allows us to completely understand the behavioural pattern of the affected unit. As stated by Charles Horton Cooley, "case study deepens our perception and gives us a clearer insight into life.... It gets at behaviour directly and not by an indirect and abstract approach."(Kothari, 2008)
2. Through case study an examiner can acquire a real and progressive record of individual experiences to disclose man's inner tensions, strivings and motivations that drive him to proceed along with the influence that direct him to assume a particular pattern of behaviour.
3. This method allows the researcher to map out the innate history of the social unit and its connection with forces and social factors implicated in the environment around it.

4. It aids in formulating important hypotheses regarding the data which can assist in testing them. Thus, case studies facilitate the enhancement generalised knowledge.
5. Depending upon the predominant circumstances, the researcher can use one or several research methods under the case study method. The use of different methods such as questionnaires, depth interviews, letters, study reports of individuals, documents and the like is feasible under case study method.
6. Case study method is valuable in establishing the nature of units to be studied in conjunction with the nature of the universe. This is why the case study method is also known as “mode of organising data”.
7. This method allows us to fully understand the history of a social unit due to its emphasis of historical analysis. Also, it is a method to suggest means for improvement in relation to the present environment of the affected social units.
8. Case studies signify the ideal type of sociological substance as they represent a very real record of personal experiences which is generally not noticed by researchers using other methods.
9. Case study method improves on the experience of the researcher and in parallel increases the researchers analysing skill and abilities.

3.6.5 Limitations

Major limitations of the case study method are highlighted below:

1. Case situations can seldom be compared and as a result the information collected is hardly comparable. Concepts and scientific classifications have to be read into it or out of it by the researcher, since the individual under case study relates history in his own words.
2. The case data is not regarded as significant scientific data according to Read Bain since they do not provide knowledge of the “impersonal, universal, non-ethical, non-practical, repetitive aspects of phenomena.” The subjectivity of the researcher does enter in the collection of data in a case study and therefore real information is not really collected.
3. Since no set rules are followed in collection of the information and only few units are studied, the danger of false generalisation is always there.

4. It consumes a lot of time and requires lot of expenditure. Additional time is required under case study method since the natural history cycles of social units is studied, albeit minutely.
5. The method is supported by several assumptions which at times may not be realistic. Hence the value of case data is always subject to uncertainty.
7. The method can only be applied in a limited sphere and cannot be used it in case of a larger society. Under a case study method, sampling is impossible.
8. Limitations lie in the response of the researched using the case study method.

In summary, the case study technique involves analysis by careful and complete observation a person or a condition or an institution. Each and every aspect of the concerning unit are studied in minute details and based on generalisations and inferences drawn.

The study by design will be qualitative in nature, using a case study approach where a semi structured interview will be conducted with management of Invotech and an online questionnaire will be administered to startups as a tool to gather data.

3.7 Sampling

Frey, Botan, and Kreps (2000), define sampling as a method that involves a selection that is representative of the population and using the data collected thereof as research information. Similarly Berinstein (2003) described sampling as a taste representative of a group. According to Lohr (1999), the sample should be a representative such that each sampling unit represents the similarities of a known number of units in the population. The base definition of sampling includes the ability of the research to select a fraction of the population that is representative. The importance of sampling theory stems from the selection of a sampling method since it seeks to make sampling more efficient (Cochran, 1953). Cochran (1953) further substantiates the use of correct sampling techniques by establishing the positive outcomes of correct sampling methods in that; researchers have the ability to reduce research costs, are able to conduct research more efficiently with respect to speed, have greater flexibility coupled with better accuracy.

3.7.1 Population

According to Wilson (2010), the definition of population is not as straightforward as it seems, population definition is primarily dependent on research questions posed and the context of the study. A population can be described as the complete group of interest where a unit is a single member of the population that the researcher wishes to investigate and make inferences about (Sekaran and Bougie, 2010).

The population of interest in this study consists of startup companies assigned to Invotech Incubator in Durban including the managers of Invotech. Members of the startup companies selected will be business owners.

3.7.2 Sampling Design

Leedy and Ormrod (2013) identify the two types of sampling design as probability sampling sometimes called random sampling and non-probability sampling.

3.7.3 Probability Sampling

The advantage of probability sampling is that it affords the researcher the ability to calculate specific bias and error with respect to the data collected. According to Henry (1990), the definition of probability sampling is the “distinguishing characteristic that each unit in the population has a known, nonzero probability of being included in the sample.” It is essentially paramount that each unit in the population have an equal chance of being selected as it eradicates the danger of researchers biasing the selection process due to their own opinions (Frey *et al*, 2000). Frey *et al*, (2000) also reiterates that the elimination of a bias selection allows the researcher to generalise the results from the sampling unit to the whole population as the sample represents the population. There are four types of probability sampling methods which are standard across disciplines (Table 3.1).

Table 3.1 Probability Sampling Methods

Type of Sampling	Selection Strategy
Simple	Each member of the study population has an equal probability of being selected.
Systematic	Each member of the study population is either assembled or listed, a random start is designated, then members of the population are selected at equal intervals
Stratified	Each member of the study population is assigned to a group or stratum, then a simple random sample is selected from each stratum.
Cluster	Each member of the study population is assigned to a group or cluster, then clusters are selected at random and all members of a selected cluster are included in the sample.

3.7.4 Non-probability Sampling

Babbie (1990) defined non-probability sampling as a convenient way where researches are able to assemble a sample with, minute or no cost and for research studies that don't require representativeness of the population or group. According to Fink (1995), non-probability sampling is a good technique to follow when conducting a pilot study, to question groups that are sensitive to questions being presented who may choose to not be honest in responses and for those where ethical considerations prohibit the researcher from approaching every member of the group. Frey *et al*, (2000) defined convenience sampling as a method that selects participants that are readily available and agree to participate in the study. Convenience sampling includes going to places such as malls, businesses, restaurants and hospitals and questioning individuals who are available and consent to being questioned.

Results cannot be generalised to the general population when the non-probability sampling method is used. Table 2 summarises four non-probability methods.

Table 3.2: Non-probability Sampling Methods

Type of Sampling	Selection Strategy
Convenience	Select cases based on their availability for the study.
Purposive	Select cases that judged to represent similar characteristics.
Snowball	Group members identify additional members to be included in the sample.
Quota	Interviewers select a sample that yields the same proportions as the population proportions on easily identified variables.

The non-probability sampling technique specifically convenience sampling was determined to be the most appropriate method as it would allow for the acquisition of data from members of the population who were most conveniently, willing and able to provide it. According to Sekaran and Bougie (2010), this type of study is often used in the exploratory phase of a research study and is probably the most applicable method to acquire information from a population that would otherwise be difficult to obtain.

3.7.5 Sample size

According to Saunders, Lewis and Thornhill (2009) the choice of the sample size is primarily dependent on the confidence level the researcher requires in the study undertaken. There are currently 20 startup companies assigned to Invotech. All 20 startups will be included in the study coupled with 2 senior managers of Invotech.

3.8 Construction of the instrument

Specific attention to the question-sequence in the questionnaire preparation should be paid by the researcher such that both quality and effectiveness of the questionnaire in

terms of responses is achieved, (Kothari, 2008). The researcher administered two instruments, a semi structured questionnaire (Appendix 1) targeted at management of Invotech and an online survey (Appendix 2) administered to the startup companies within Invotech. Each questionnaire was accompanied by a letter of motivation encouraging the participation of the respondents. Questionnaires were administered using an online tool called Questionpro. Respondents were sent an email with a hyperlink attached which directed respondents to the survey start page. The questionnaire designed in the study was aimed to gather data from incubatees which addressed observations and objectives identified in the literature review.

3.9 Tests of Sound Measurement

Validity, reliability and practicality are three considerations that are essential to prove sound measurement when evaluating a measurement tool used in a study. According to Thorndike and Hagen (1977), validity can be described as the degree to which a test measures what is required to be measured, whilst reliability is aligned to both accuracy and precision of a measurement procedure. Practicality can be attributed to a vast array of factors which are not limited to economic, convenience and interpretation.

3.9.1 Validity

Validity is considered the most important criteria since it is used to indicate the extent to which an instrument measures what it is supposed to measure. Validity is the degree of differences found with an instrument used in measurement reflecting true differences among those tested. Validity can be seen as a utility. There are three types of validity connections:

(i) Content validity;

The degree to which a measuring instrument provides ample coverage of the study topic is termed content validity. A good example of content validity is where a measuring instrument contains a representative sample of the universe, primarily having a judgemental and intuitive determination. It can also be determined by a panel of judges, evaluating how best the measuring instrument meets the standards, however there is no numerical way to express it.

(ii) Criterion related validity

The ability to predict an estimate or outcome of a current condition is termed criterion-related validity. Criterion-related validity mirrors the success of measures used for empirical estimating. The criteria of concern needs to possess the following qualities:

- Relevance
- Freedom from bias
- Reliability, in terms of stability and reliability
- Availability, Information needs to be available

Criterion-related validity can be described as a broad term that encompasses both, predictive validity which refers to the usefulness of a test in predicting future performance and concurrent validity which refers to the usefulness of a test in meticulously relating to other measures of validity. Criterion-related validity is further expressed as the coefficient of correlation between test scores and some other future performance.

(iii) Construct validity

The extent of confirmation to predicted correlations with other theoretical propositions is termed construct validity and is said to be the most complex and abstract validity connection. Construct validity can explicitly be described as the degree to which scores on a test can be accounted for by explanatory constructs of sound theory. In determining construct validity, the association of a set of propositions with the results received from the instrument is made. If there is a correlation between measurements on the devised scale in a predicted way with other propositions, it can be concluded that there is construct validity.

Content validity is considered in the current study. By obtaining feedback from the supervisor of the study and managers of Invotech coupled with respondents of the pre-test, the researcher was satisfied that the responses received met the objectives of the research study and drew confidence in the fact that the test of validity was met.

3.9.2 Reliability

Another critical test of sound measurement is reliability. The ability of a measuring instrument to generate consistent results is termed reliability. Reliability can be divided into two aspects, being stability and equivalence. The stability aspect is normally concerned with acquiring consistent and repeatable results with measurements of the same person and same instrument. The extent of stability is determined by comparing results of repeated measurements.

The equivalence aspect of reliability focuses on the degree of errors that may be introduced by different investigators and/or samples of items under the study. Reliability can be enhanced in one of two ways:

- (i) To improve the stability aspect, the conditions under which the measurement takes place needs to be standardised.
- (ii) To improve the equivalence aspect, the conditions under study need to be meticulously designed directions for measurements with no variation amongst groups. This can be aided by use of trained individuals to conduct the research coupled with broadening the sample of items used.

3.10 Pretesting of the Questionnaire

According to Kothari (2008), a pilot survey is a replica and rehearsal of the main survey. The pre-testing of the questionnaire conducted by experts sheds light on weaknesses (if any) on both the questionnaires and survey techniques. Experience gained in this way ensures improvement can be effected.

The pilot test group in this study consisted of staff members of Invotech.

3.11 Data collection and analysis

The online tool (Questionpro) used to host the study automatically captures the participant's responses to an online database. Each response was assigned a numerical variable that can be exported to a statistical package like SPSS for analysis.

The analysis of the data was partly descriptive and exploratory in nature.

The two different methods of data collection employed by the study allowed for triangulation, which demonstrates validity allowing strengths and weaknesses of both the semi structured interview and online survey to complement each other.

The semi structured interview with Invotech management was transcribed. The quantitative data from the online survey was used to support, augment and differ with the findings of the semi structured interview. The findings from both data collection methods used, assisted in the construction of a textured portrayal of the case study. Once the broad themes were extracted from the data, the categorical breakdown of the data allowed the allocation of codes which was used to sort the data from the semi structured interview.

3.12 Ethical considerations

In order for the researcher to conduct the study a gatekeeper's letter was obtained from the CEO of Invotech. An application requesting ethical clearance (Appendix 3) from the University of Kwa-Zulu Natal was granted and furnished in the form of an ethical clearance letter. An informed consent letter was requested from all respondents that participated in the questionnaire.

3.13 Conclusion

This chapter detailed an analysis of the research methodology for this study. A case study method approach was employed in the study which incorporated a semi structured interview and a structured questionnaire. Data collection methods in conjunction with data analysis were described and its relation to validity and reliability were determined. Ethical consideration was mentioned in the chapter.

The outcome of the study in terms of results, observations and discussions is documented in the chapter that follows.

CHAPTER 4: ANALYSIS AND DISCUSSION

4.1 Introduction

The findings of the data collected in the study are presented and discussed in this chapter. Both quantitative and qualitative data was collected and analysed using a case study research design. Quantitative data was generated by an online survey using question pro as a platform to launch the survey. The survey was sent out to a sample of twenty incubatees currently under the Invotech umbrella. In the discussion of the data analysis that follows, data accumulated from the online survey and the interviewees will be used in a complementary manner and discussed together in order to gain a comprehensive understanding of this case study. Qualitative data was collected by conducting interviews with management of Invotech.

4.2 Demographics

The management of Invotech indicate that incubatees have some form of tertiary qualification coupled with adequate years of experience. Management of Invotech indicate selection of potential incubatees is based on targeted selection whereby incubatees are selected on product target market (innovative technology) and educational background.

A total of twenty questionnaires were sent out, tabulated below is the response rate. Only twelve respondents completed the questionnaire in full, the remaining eight were aborted during the survey at different stages. These results were excluded during the analysis. A response rate of 60% was achieved. The semi structured interview was conducted with the CEO of Invotech and the Business development manager.

Table 4.1 Response rate

Questionnaires sent out	Questionnaires started	Questionnaires complete	Questionnaires aborted	Percentage
20	20	12	8	60%

Table 4.2 Interview respondents

	Participant 1	Participant 2
Position	Chief Executive Officer	Business Development Manager
Years of Experience	5 years	15
Qualification	Chemical Engineering	MBA
Area of Expertise	Innovation Management	SME Management

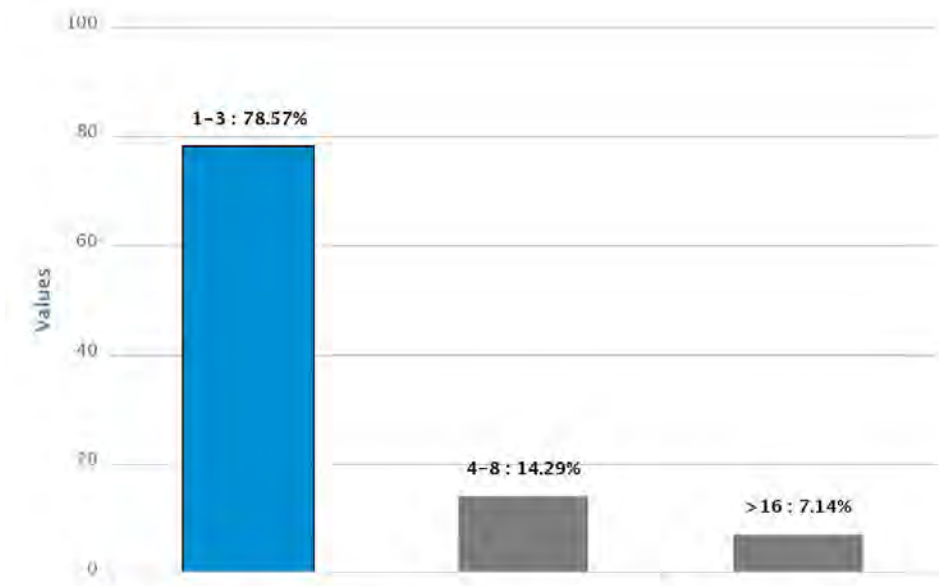


Figure 4.1 Percentage of employees in a startup

Results from the online questionnaire indicate that majority of startups under the Invotech umbrella employ between one and three employees (78.57%) (Figure 4.1). According to Ries (2011), a startup following a lean approach differs from a standard startup, by the way it is structurally organised. Startups following the traditional approach focus more on placing personnel in specific business units such as operations, finance, human resources and logistics whereas startups following a lean approach focus more on product development, and less on the business structure. The results from the survey indicate that majority of startups within Invotech have the foundation of a lean startup approach with specific reference to number of employees.

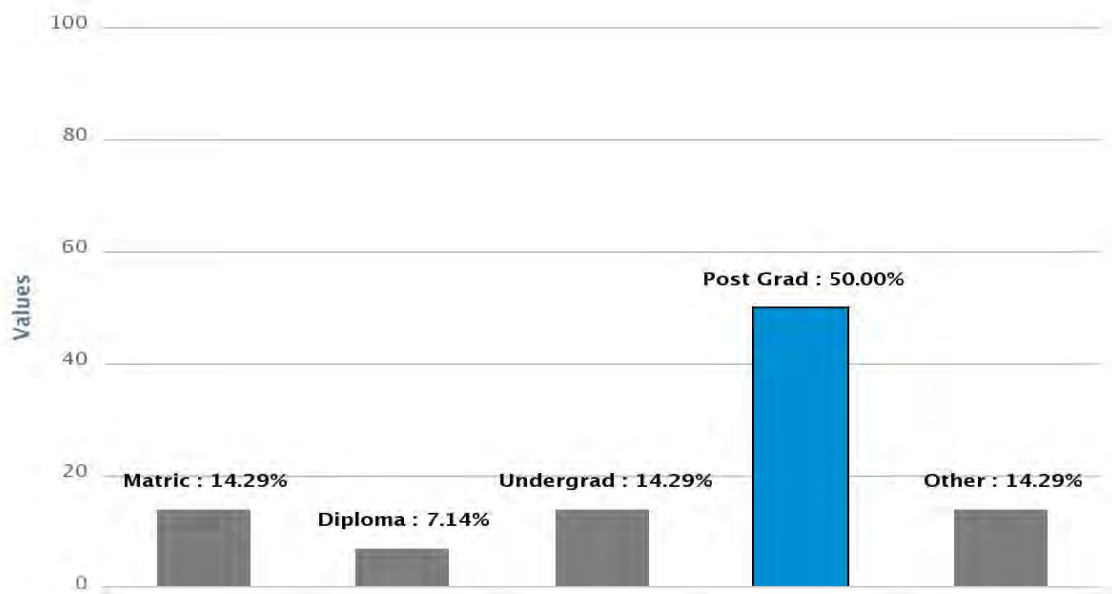


Figure 4.2 Educational background of director

According to figure 4.2 a post graduate qualification was the prevalent educational background held by half of the respondents which reiterates that incubator support is based on targeted selection with special emphasis placed on educational background.

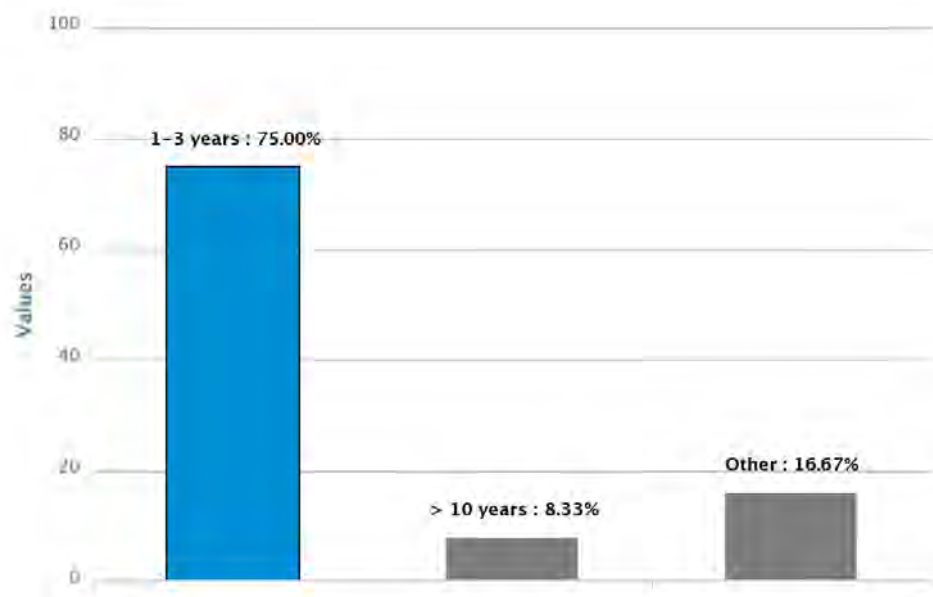


Figure 4.3 Number of years registered as an SME

Figure 4.3 depicts the number of years a startup has been formally registered within the republic of South Africa. A total of 9 startups fall within the 1-3 year category, with only 1 startup surpassing the 10 year mark. The remaining startups classified as other, are still within the formal process of registering an entity.

The empirical data are in keeping with the hypothesis of Rogerson (2001), in that successful entrepreneurs need to be adequately trained and educated. Both management and startups at Invotech have some form of tertiary qualification coupled with adequate years of experience in both industry and running a startup.

The results of the study conducted by Olawale & Garwe (2010) relating to the barriers to entry faced by SMEs in South Africa, concludes that most startups cease to exist within four years, the empirical data cannot be generalised due to the small sample size even though data indicates a high number of startups under 3 years whilst just one with greater than 10 years in operation.

4.3 Objectives of the study

The objectives that were set for this study were linked to the various questions in the research instrument so as to ensure that sufficient data were collected in order to sufficiently and completely answer the research question. The presentation and discussion of results are set out below for each objective of the study.

4.3.1 Objective 1: The concept of Lean (Management)

To determine if Invotech is aware of lean startup methodology tools and techniques, respondent's awareness of lean startup methodology were tested. Lean startup methodology is a derivative of lean manufacturing. Lean manufacturing is a technique that has received worldwide attention and support and is adopted by a multitude of organisations. Lean startup methodology is a separate body of knowledge with its own tools and techniques attributed to it however it is often confused with lean manufacturing. The questions attempting to investigate this were,

Question: Are you aware of lean startup practices?

Participant 1: *“From a manufacturing point of view, yes ...”*

Participant 2: *“Lean, yeah, I studied it for my MBA. But I can’t say I’m very too familiar. It’s just something that I got, got through during my studies...”*

Based on the response to the question, both participants associate lean startup with lean manufacturing. A follow-up question was administered in order to gain a deeper understanding of the participant’s view of lean.

Question: How would you describe lean startup?

Participant 1: *“I think, it’s Six Sigma...”*

Participant 2: *“You have a pipeline, which has an end point, which is your product, people need your product and you need to get it to them as soon as possible if not, then you go back and refine.”*

Based on the responses, the researcher decided to highlight a few concepts of lean startup before proceeding with the tools and techniques portion of the interview with the intention of extracting the participant’s actual understanding of lean as a whole and not simply as terminology and application, with specific emphasis on development of a minimum viable product (MVP) and innovative accounting. Once a background on lean startup was provided, the interview proceeded with the tools and techniques portion.

4.3.1.1 Minimum Viable product (MVP)

The rapid generation of a MVP allows startups to elicit consumer responses in real time, allowing the startup to modify or change product offering such that it meets a consumers expectation satisfying a need (Blank, 2013). According to Ries (2011), the MVP forms the cornerstone of lean startup methodology, it is through generation of a MVP that startups draw most benefit from validated learning and innovative accounting. The question attempting to investigate this were:

Question: Do you encourage startups to engage with consumers to see if the product has a market before it is fully developed?

According to both participants, the concept of a MVP is encouraged but not enforced.

Participant 1: *"we always encourage and approach were, even from the idea stage the entrepreneur engages with the potential market... and then the development, of, their prototype is actually informed...., we monitor the progress of the startup but , normally, what, we do with the entrepreneur, it will be just to ask them a simple, basic question. So, who will be your potential customer? Have you engaged them or not, it's not like a specific requirement but we encourage them to just go and speak to them..."*

Participant 2: *at this quarter, I said three months what we try to ascertain is viability. So, as part of viability and feasibility studies, this is where we get our information because us as well as Invotech we can't invest time where there's no need, you know, there's no market for it..."*

"We try to encourage or motivate them more on the business management. Because I think they're doing more of research. So, now we are at the next quarter, ok train. It's uplifting and it's developing business wise. And from there we develop a prototype, to test the market.

4.3.1.2 Innovative accounting

Ries (2011) describes innovative accounting as a technique that provides an in-depth level of analysis identifying early on, if the business is on a path that promotes sustainability. Evaluating customer response towards product offering during the MVP stage allows one to clearly scrutinise performance making changes where deemed necessary. The question attempting to investigate this were:

Question: How do you evaluate startup performance?

According to both participants, there is currently no method employed to evaluate startup performance. A project plan is drafted by the startup and signed off by Invotech, the onus is on the startup to execute deliverables according to the project plan, and failure to do so may lead to an extension, which is capped at a maximum of three years.

Participant 1: *“In total, people have up to three years maximum that they can stay in the incubator. However, instances, depending on how the project is progressing or not progressing we may decide to terminate the contract along the way... but when it comes to the termination, its mainly based on the initial project plan that would have been drafted because, now, we would, in terms of that project plan say that at a particular point you need to be here. So, if that is not happening we then discuss the reason why that is not happening is due to either the client is just not committed or not pulling their weight. Or they will just never get the necessary resources resource and so forth...”*

Participant 2: *“We have a project that we just started where we try to work with them quarterly where we’ll setup milestones so that we can move them from one space to another... So it’s a trial, we starting off but seemingly it’s going to be effective. Because they know at the end of the three months they need to show some, some developments. Failure, they can’t move forward...”*

Lean startup methodology can be interpreted as an addendum to lean manufacturing designed solely for startups. The concept of lean is synonymously associated with Toyota which tends to inhibit the emergence of lean startup methodology as a standalone technique. Lean startup tools and techniques include, generation of a MVP, validated learning and innovative accounting. The findings indicate that Invotech

associates lean startup methodology with lean manufacturing, though the concepts are misaligned, the application is present, however it is combined with several aspects that dilute the benefits attributed to lean startup. The tools and techniques associated with lean startup are not practiced to its full extent, hence progress can't be evaluated. According to Ries (2011), validated learning is driven by a MVP, startups are able to test market response and refine or pivot which contributes to a startups knowledge base, with consumer engagement startups develop a validated method that encourages learning. According to the participants, startups, though encouraged to develop a MVP and engage customers, it is not a practice that is enforced. Startups absorb the risk of construction of a perfected product that has no market and does not satisfy a need. Lean startup methodology is designed for technology startups, based on participant response, lean startup methodology is not clearly understood which will impede implementation at Invotech.

4.3.2 Objective 2: The concept of lean (Startups)

To determine if startups within Invotech are aware of lean startup methodology tools and techniques, respondent's awareness of lean startup methodology were tested. Startups operate in an environment that is constantly changing, identifying and adopting a specific management techniques is often a determinant of success or failure. Based on the findings discussed previously, startups are the drivers, formulating a project plan which includes tangible deliverables (milestones) that need to be met. To determine if startups adopt lean startup techniques, the following questions attempting to investigate this were,

Question: Have you heard of lean startup methodology?

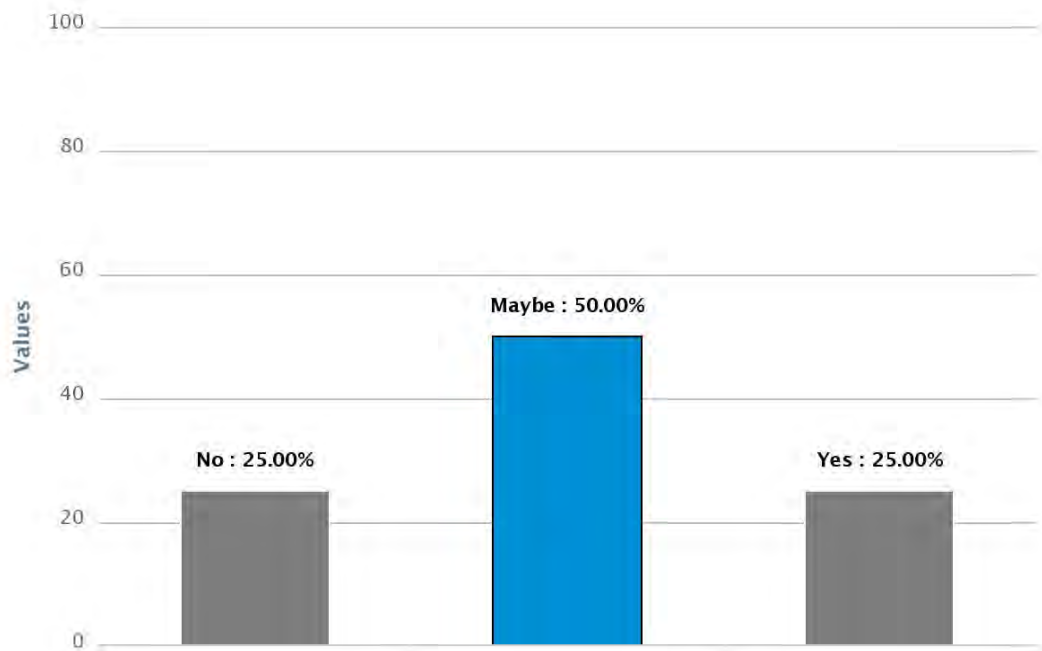


Figure 4.4 Concept of lean

According to the survey, 3 respondents didn't hear about lean startup methodology, followed by 3 who did, 6 respondents were uncertain about the methodology (Fig 4.4).

Question: Are you familiar with the concept of minimal viable product (MVP)?

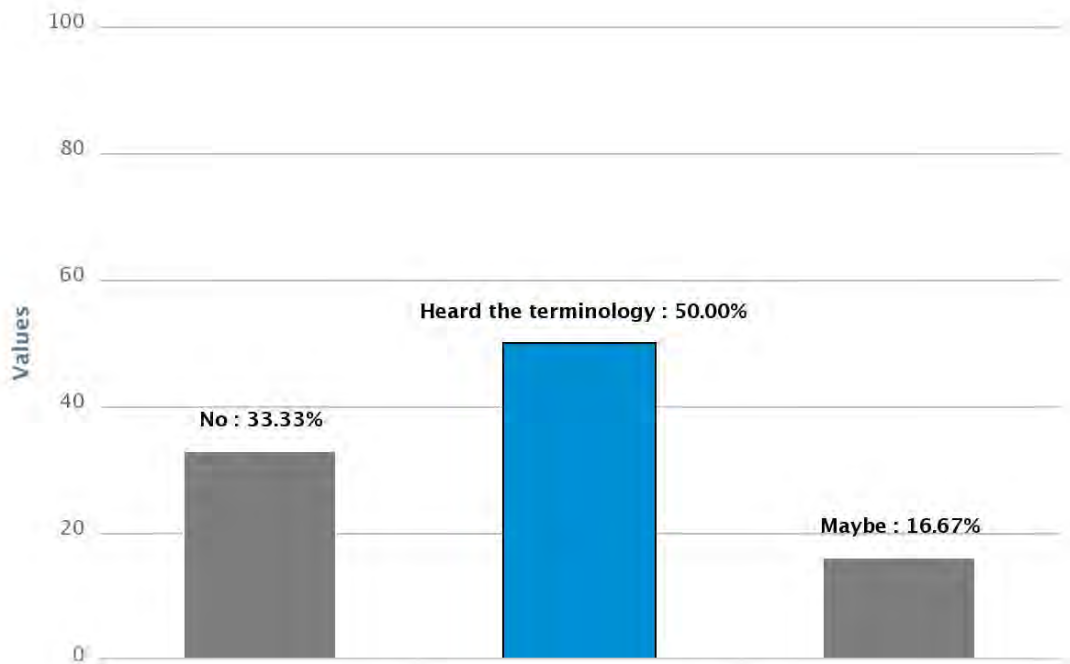


Figure 4.5 The concept of MVP

According to figure 4.5, 4 of the respondents were not familiar with the concept of a MVP, whilst 6 respondents claimed to have heard the terminology, 2 respondents indicate possible knowledge of a MVP

Question: Are you familiar with the concept of validated learning?

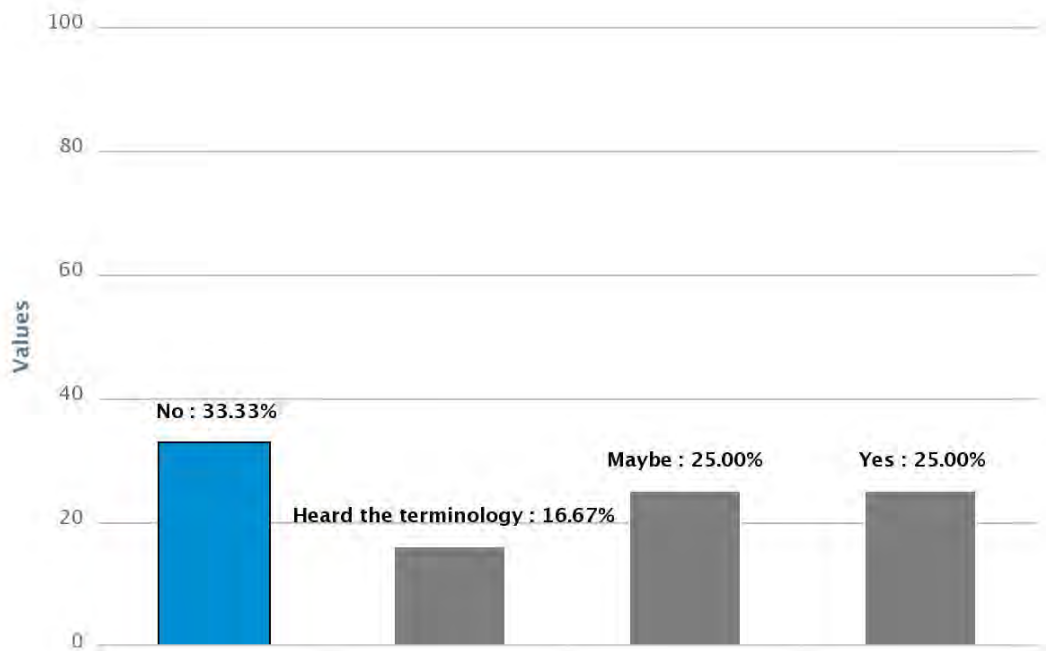


Figure 4.6 Concept of Validated learning

As depicted in figure 4.6, 4 respondents are not familiar with validated learning with 3 respondents confirming they do. 5 respondents claim to have heard to the terminology.

Question: Are you familiar with innovative accounting practices?

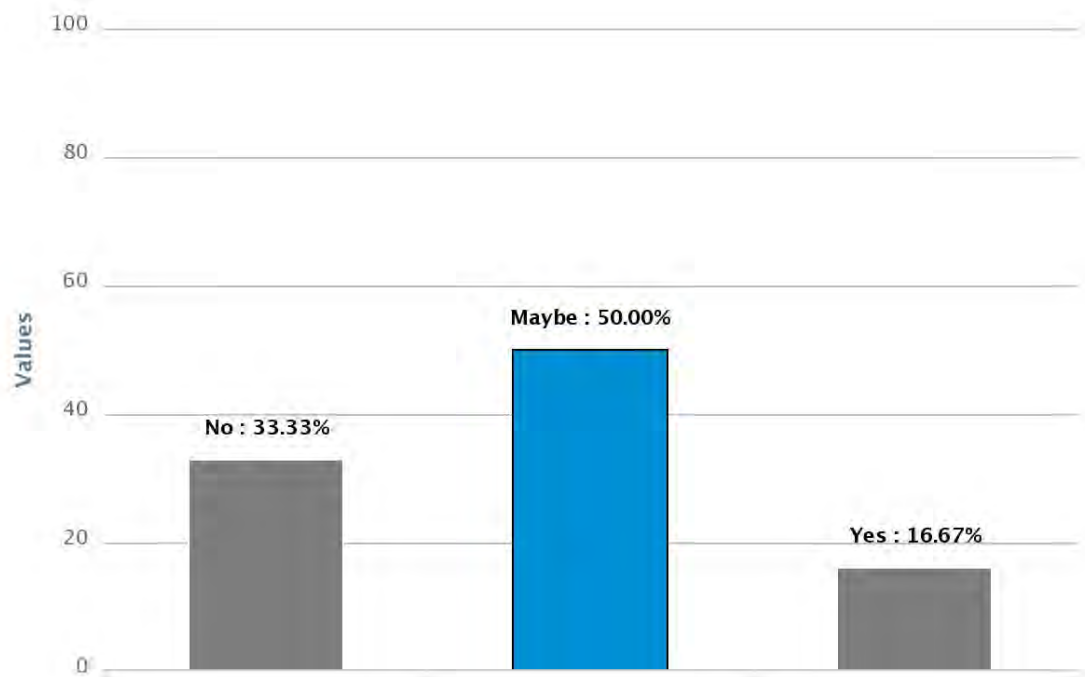


Figure 4.7 The concept of innovative accounting

According to figure 4.7, when questioned on the concept of innovative accounting, 4 respondents could not contemplate what innovative accounting meant or stood for, with 6 respondents claiming to have some idea, only 2 respondents confirmed actually knowing what innovative accounting was.

The findings indicate that startups within Invotech have a limited knowledge on lean startup methodology, since the instrument administered was a questionnaire, startup responses could not be probed further thus actual startup knowledge of the concepts associated with lean startup could not be confirmed. Based on the findings it can be concluded that startups currently under incubation at Invotech have a limited knowledge base of lean startup methodology.

4.3.3 Objective 3: Application of lean startup techniques (Startups)

To determine if startups adopt lean methodology techniques, consciously or subconsciously in their startup operations, respondent's application of lean startup techniques were evaluated. Lean startup techniques are often practiced by startups

without acknowledgement of the methodology. The question attempting to investigate this were:

Question: Does your product offering, involve interacting directly with consumers?

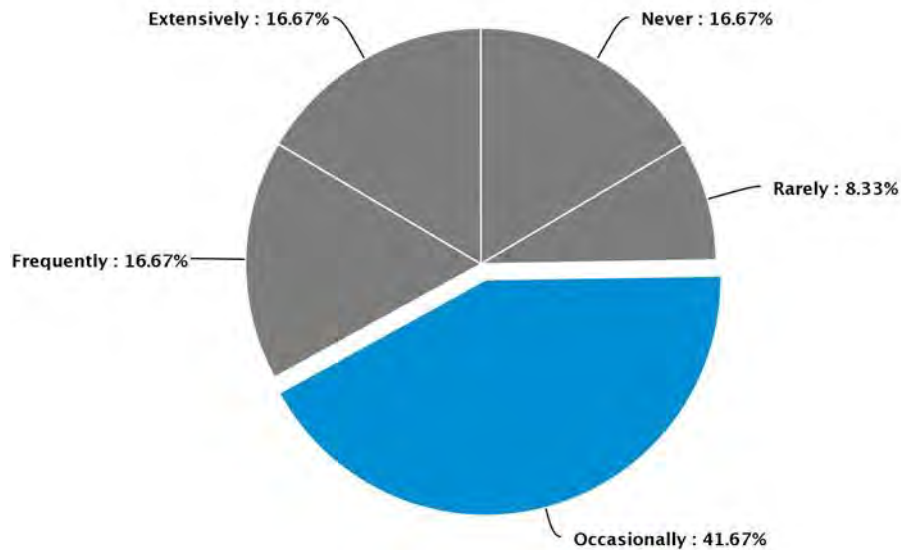


Figure 4.8 Interaction with consumers

According to the figure 4.8 only 2 of the respondents have no interaction with customers, with the majority of respondents having occasional interactions with customers.

Question: Do you believe that your product has to be perfect before it reaches the consumer?

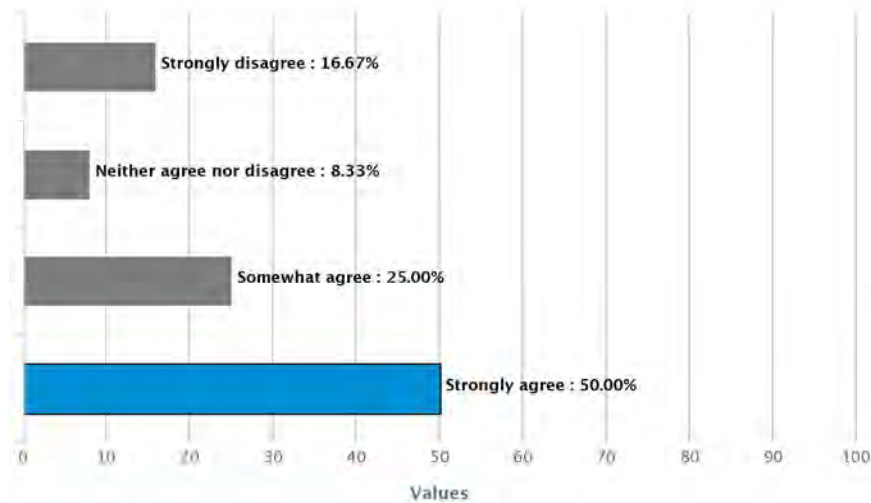


Figure 4.9 Perfect product offering

A total of 9 repondents believe that product has to be perfect when delivered to the customer. Only 3 repondents have the view that product need not be perfect when delivered to the customer (figure 4.9).

Question: Do you believe consultation with consumers during the design phase of your product offering is important?

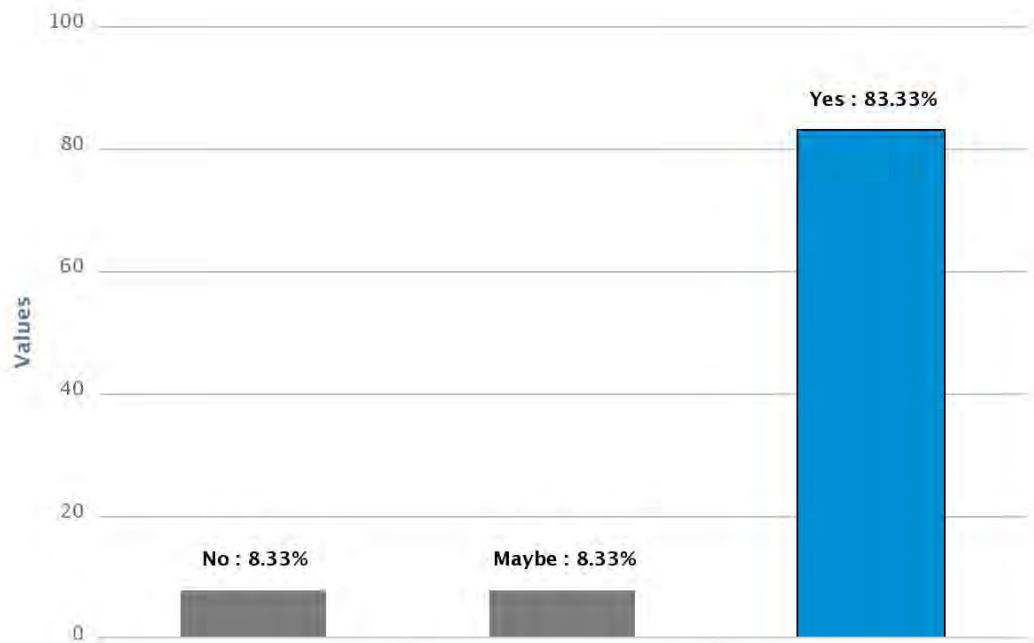


Figure 4.10 Consultation with consumers during product design

According to figure 4.10, 10 respondents have the view that consultation with consumers during the design phase is important with only 1 respondent refuting the idea

Question: Would you change business direction or product offering based on consumer response?

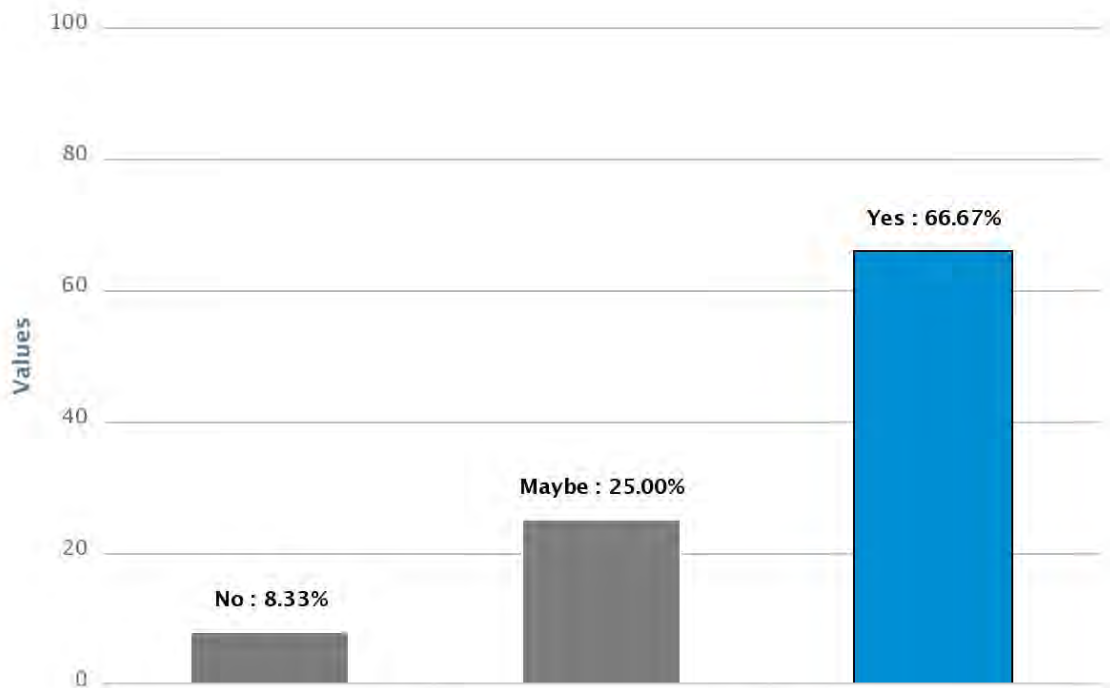


Figure 4.11 Change product based on customer response

According to figure 4.11, 8 respondents are willing to change product offering based on consumer response with 3 respondents open to the idea

Question: How often do you evaluate company performance?

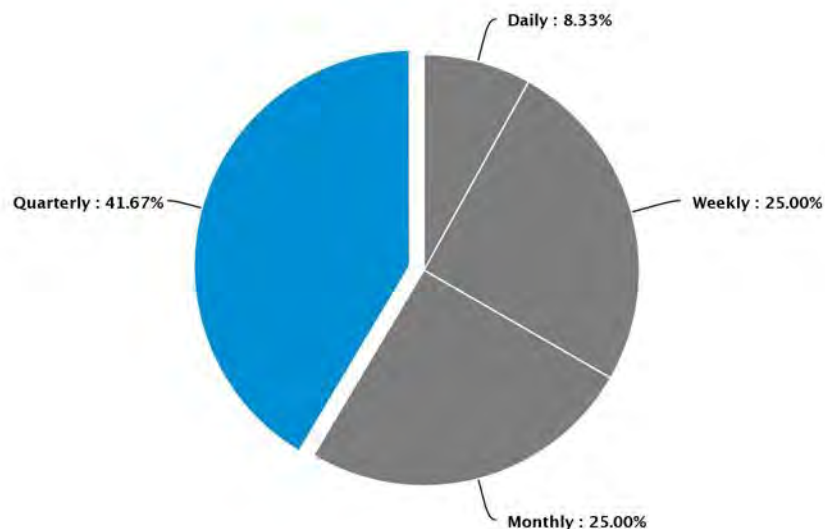


Figure 4.12 Evaluating company performance

5 respondents evaluate company performance every quarter, with 3 respondents evaluating performance monthly, followed by 3 respondents evaluating performance weekly. Only 1 respondent evaluates performance on a daily basis (figure 4.12).

According to Ries (2011), a MVP is constructed to test customers responses, continuous engagement with customers allows a startup to refine its product offering or change it based on customer interaction. Ries (2011), further reiterates the importance of religiously evaluating company performance frequently since startups have limited resources, it is prudent to scrutinise company performance frequently such that potential losses can be eliminated if product performs poorly. The findings of the quantitative survey indicate that startups consider interaction with customers during the design phase as an important part of product development with the majority of startups willing to change product offering based on customer responses. Whilst the majority of startups evaluate company performance on a quarterly basis, the remaining respondents evaluate company performance on a more frequent basis. The findings indicate that startups at Invotech practice lean startup techniques, specifically the concept of Innovative accounting and MVP in daily routine operations without acknowledgement that these techniques are tools of lean startup methodology.

4.3.4 Objective 4: Is Invotech positioned to offer lean startup

To determine if Invotech is positioned to offer lean startup, Invotechs current service offering and policies were evaluated in conjunction with feedback from respondents. Invotech provides a platform for tech savvy startups to grow their ideas. Startups are afforded the opportunity to be trained and mentored whilst having access to facilities that encompass business registration, access to office space, communication mediums such as internet and email as well as access to markets. The questions attempting to investigate this were :

Question: What service offerings does Invotech currently provide to startups?

Participant 1: *"I think, obviously our, mandate it's around assisting start-ups around technology, with technological ideas and those ideas have to be innovative. So, those two things are very important to us and the issue of integrity, you know, we, deal with people's confidential information and, transparency is also key to board members, funders and even to clients. It is very important to be transparent. So, we group it into, into four pillars. The first one being mentorship, second on being training, and the third one being access to facilities and the fourth one being access to market, facilitating access to market... we provide mainly non-financial support, In instances where we provide financial support it will be because there is a third party..."*

Participant 2: *"where you need assistance with registration to formalise your business. Where we'd identify training needs, business skills and taking you through the technical parts of your product and making sure that we provide network opportunities for you, you know. You attend exhibitions to promote yourself. So, it involves a lot of engagement with the client to promote them basically, and check the feasibility of their business..."*

The application of lean startup methodology requires radical change where performance indicators and metrics are realigned to measure actual startup performance, tracking company performance in real time. A paradigm shift from current practice to lean startup methodology would promote the formulation of critical success factors that would not only evaluate startup performance, but also incubator support offerings and its relevance to growing successful startups. Management of Invotech were posed with the question,

Question: Is Invotech positioned to support lean startup methodology?

Participant 1: *“Umm, not at the moment, because the reason why I say not at the moment, in terms of projects scope the manner in which we manage projects, the one variable you know, you’d basically be looking at the quality, time and budget. The one variable that we as an incubator that we normally relax is the time part. If there’s issues with either the budget or the quality we often can’t compromise on those so it’s only the time that get affected...”*

Participant 2: *“Most definitely, yeah, that’s the direction we’re heading,”*

Based on the findings, the application of lean startup methodology can be summarised as follows:

- According to participant 1, each project is scoped based on cost, time and quality. All three metrics represent the triple constraint, and whilst each constraint has a proportionate relationship with each other, in that every action has a reaction e.g. an increase in time has an resultant impact on cost, production of higher quality products has an effect on both cost and time, the metric that Invotech is most flexible with is, time. Due to the flexible time stipulation, Invotech, according to participant 1 is not ready to support lean startup practices.

- According to participant 2, Invotech is most definitely ready to adopt the methodology, however participant 2's optimism is constrained by the time frame afforded to startups under Invotech.

4.4 Conclusion

The analysis of both Invotech management and Incubatees reveals that the concept and application of lean startup methodology is not clearly understood however certain concepts of lean startup methodology is subconsciously enforced and practiced. It is evident that there are barriers to lean startup implementation which can be overcome if the support offering of Invotech is modified. Startups are willing to adopt the lean approach however it requires the engagement of Invotech management and support staff to roll out the implementation plan.

CHAPTER 5: CONCLUSION

The introduction of incubator support services, supported and funded by Government, are mechanisms currently employed in South Africa to assist startups with fundamental tools and techniques needed to create viable and sustainable product offerings. Since the success of startups are dependent on service offerings of incubator facilities, it is prudent to determine if, Incubators are adequately equipped with skills, knowledge and expertise needed to strategically position start-ups in a favourable position.

This case study set out to explore the concept of lean startup methodology with respect to customer development at Invotech incubator in KZN. The aim was to investigate the service offering of Invotech, if Invotech is aware of lean startup practices and if Invotech is aligned to support lean start up methodology.

5.1 Key findings

- Invotech is not familiar with lean startup methodology Data from both the online survey and semi structured interviews confirm that both management and incubatees of Invotech confuse lean startup methodology with lean manufacturing drawing assumptions and conclusions of what lean startup means using lean manufacturing as a reference point.
- The service offering of Invotech can be summarised as, mentorship, training, access to facilities and markets. Data extracted from the interview describes the core offering of Invotech as an evaluation of product offering with respect to feasibility and target market, once the feasibility is determined the startup is offered non-financial support that has an expiry date of three years from date of inception, it is up to the startup to seek support or utilise benefit from Invotech.
- Startups within Invotech have a limited knowledge of lean startup methodology. Analysis of the data from the online survey emphasises the limited knowledge startups possess on lean startup methodology and practices. Tools such as formulation or development of a MVP is adopted subconsciously by a select few however the full value is not recognised as the MVP is evaluated using conventional methods over long time periods independent of its corresponding counterparts which is Innovative accounting and validated learning.

- Startups are willing to adopt and implement lean startup methodology. The survey confirms unanimously that startups are optimistic about the benefits of lean and are willing to adopt and implement lean startup methodology.
- Invotech is not currently aligned to support lean startup methodology. Management of Invotech have contrasting views about lean startup methodology but upon further investigation, it was concluded that Invotech is not aligned to offer lean startup methodology due to its current strategic objective, in that Invotech is focussed on long term growth evaluating company performance every quarter or as determined by the project plans assimilated by the startup. This strategy goes against lean startup methodology which underpins the practice on formulation of an accelerated approach, evaluating performance in real time, changing or modifying responses based on consumer response.

5.2 Recommendations

- Training on lean startup methodology is essential for both management and clients of Invotech. Training should be provided such that both management and startups are aware of the benefits of lean startup methodology and what is required for implementation
- The service offering of Invotech needs to be aligned to lean startup practices, where startup viability is determined using an accelerated approach instead of letting time run its course. Invotech would need to reduce the three year development plan and incorporate a twelve month strategic plan, aimed at accelerating startup growth and determining viability. This approach would provide a faster turnaround of viable projects and shelve non-viable ones allowing and affording a greater number of startups the ability to receive incubation support.
- Management of Invotech should be more involved with startups where startup development is tailored by design instead of using a generic approach. Invotech should create a platform where startups can voice opinions, share tools and experiences that have proved to be successful or vice versa, the platform by design, should be implemented to encourage and grow startups and affirm the support of Invotech with startup development.

- To re-evaluate the metrics that Invotech employs to track startup progress. Invotech should enforce the concept of developing a MVP using innovative accounting to monitor progress.

5.3 Limitations of the study

- The study is confined to just one geographical location.
- Results and findings cannot be generalised since non-probability sampling was used in the study
- The recommendations are specifically tailored for Invotech management and Incubatees
- The application of lean startup methodology is confined to technology startups
- Invotech is a growing incubator with a small amount of clients and limited availability of resources

5.4 Contribution of the study

The study highlights the concept of lean startup methodology and its application in Incubator support programmes. An assessment of lean startup practices at Invotech identifies a significant gap that exists between Invotech and technology startups that can be bridged with lean startup tools and techniques. Technology Incubators are strategically positioned and equipped to adopt the lean startup approach which can be disseminated to incubatees (startups). Startups adopting the lean approach are equipped to determine the viability of a project in its infancy which positions a startup to pivot or continue. The ability to pivot or continue not only benefits the startup but also the economy as Incubators will be able to support a larger number of startups, thereby increasing a startups probability of success.

5.5 Recommendations for further research

The research study, coupled with both the findings and limitations identified, provide guidance as to recommendations for further research. Notwithstanding the limitations identified, this study will serve as a foundation for further research into the field of lean startup methodology. The recommendations for further research include the following:

- Research monitoring, which involves tracking the development of startups that use lean startup tools and techniques. This may be achieved using action research methodology.
- Research monitoring that evaluates both the relevance and effectiveness of lean startup methodology. This can be achieved by contrasting similar startups adopting the conventional approach to business practice and those adopting the lean startup approach. Metrics percolating from the exercise would include but not limited to, customer reception, access to market, sales and time taken from concept to product to market to profitability.
- Progressive development of a startup that examines the relative environmental, cultural and personality traits that promote the adoption of lean startup tools and techniques in a startups lifecycle. This can be achieved by experimental research.

5.6 Conclusion

A shrinking GDP, rising inflation and increasing unemployment are focal points that Government needs to address in order to stabilize and rehabilitate the economy. In light of the challenges and difficulties faced by Government, the need to invest in infrastructural models that contribute to startup development needs to be explored. Traditional business development requires extensive planning, consultation, product development, testing and marketing to deliver product to customers. In an ever changing society, time is considered an important tool needed to gain competitive advantage and avert product failure. Delivering product to the market in the shortest time possible by bypassing the barrier of traditional business practice, is a technique sweeping the startup sector under the banner of, lean startup methodology.

Lean startup methodology has the ability to rapidly determine business viability, the sooner we realise the benefit of implementing the concept of lean the sooner we will be able to recognise economic stability.

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Appendix 1:

Semi Structured Interview

Interview Guideline

Overview

Topic: Lean start-up methodology. A case study of customer development at Invotech Incubator

Time: 15-20 minutes

Medium: Face to face with recording

Questions

1. Opening the conversation
 - a. Introduction of myself
 - b. Objectives and goals of the research
 - c. Ethical guidelines and clarification of audio recording
2. Please introduce yourself, mentioning current position, educational level and experience.
3. What are the core values of Invotech?
4. How do the core values relate to startup development?
5. Are you aware of lean startup practices?
6. How would you describe lean startup?
7. Do you encourage startups to engage with consumers to see if the product has a market before it is fully developed?
8. How do you evaluate startup performance?
9. What service offerings does Invotech provide to startups?
10. Is Invotech positioned to support lean startup methodology?

Appendix 2:

Online Questionnaire

Dear Respondent

I, Sabastian Naicker, currently in the final year of my MBA at the Graduate School of Business at the University of Kwa-Zulu Natal, cordially invite you to participate in a Questionnaire that forms an integral part of my dissertation. The title of my dissertation revolves around “Lean start-up methodology a case study of customer development at Invotech Incubator in KZN”. The aim of my research proposal is to evaluate the concept of lean start-up methodology and its application on start-ups assigned to Invotech Incubator in KZN. Both Invotech and start-ups will be evaluated based on exposure and application of lean start-up methodology coupled with implementation. The purpose of the study aims to evaluate the product and service offering of Invotech and if it is adequately equipped to adopt, support and encourage lean start-up practices. Data collected from the questionnaire will be collated and interpreted and would be measured by evaluating both start-up and incubator response based on lean start-up methodology.

Your involvement is completely voluntary and hence any refusal on your part will bear no negative consequence.

All questions relating to the study can be directed to me or my supervisor.

Name	Number	Email
Student: Sabastian Naicker	0718718683	Sabastian.naicker@me.com
Prof S. Cassim		Cassim@ukzn.ac.za

The questionnaire consists of 23 questions and should take 8-10 minutes to complete.

Questionnaire

Title: Lean start-up methodology a case study of customer development at Invotech Incubator in KZN

Please cross the relevant boxes with an X/or unless specified otherwise. Please select only one answer, all information provided is confidential and will not be used to implicate the respondent in any shape or form.

1. How many employees are employed in your current organisation

1-10	11-20	21-30	31-40	>40

2. What is your current educational Level?

- ☐ High School
- ☐ Diploma
- ☐ Undergrad
- ☐ Post Grad

3. What sector does your current product offering fall under

- ☐ Green technology
- ☐ Support services
- ☐ Administrative services
- ☐ Technology services
- ☐ Manufacturing
- ☐ Analysis
- ☐ ICT development
- ☐ Renewable energy
- ☐ All of the above
- ☐ Other

4. How long have you been in the SME industry

- ☐ 1-3 years
- ☐ 4-5 years
- ☐ 6-9 years
- ☐ > 10 years

5. Does your work involve interacting directly with consumers

Never	Rarely	Occasionally	Frequently	Extensive

6. Are you familiar with Minimal viable product offering

No	Heard the terminology	Maybe	Yes

7. Are you familiar with Validated learning

No	Heard the terminology	Maybe	Yes

8. Do you believe that your product has to be perfect before it reaches the consumer

Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree

9. Do you encourage the use of consumer engagement during the design/support phase

Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree

10. Would you evaluate and consider consumer insights during the product development/support phase

Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree

11. Would you change business direction or product offering based on consumer response

Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree

--	--	--	--	--

12. How often do you evaluate company performance

Every day	Every week	Every month	Every quarter	Every year

13. Have you heard of Lean start-up methodology

- ☐ Yes
- ☐ No
- ☐ Maybe

14. What is your level of understanding regarding Lean start-up methodology
Manufacturing

None	Basic	Intermediate	Advanced	Expert

15. Are you aware of other organisations/start-ups adopting a lean/ non-conventional approach

- ☐ Yes
- ☐ No
- ☐ Haven't really paid attention

16. Are you aware of the benefits of lean start-up methodology

- ☐ Yes
- ☐ No
- ☐ Not Really
- ☐ Not interested

17. Are you aware of the following lean techniques (Tick all the applicable options that apply)

Push and Pull Mechanisms (Kanban)	<input type="checkbox"/>
Validated learning	<input type="checkbox"/>
Continuous Flow	<input type="checkbox"/>
Just in Time (JIT)	<input type="checkbox"/>

KPI (Key performance indicators	<input type="checkbox"/>
Innovative accounting	<input type="checkbox"/>
Minimum Viable Product	<input type="checkbox"/>
Value Stream mapping	<input type="checkbox"/>

18. Are you willing to consider lean start-up techniques

Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree

19. Do you believe that lean start-up techniques would benefit your organisation

Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree

20. Would you share the concept with fellow organisations

- ☐ Yes
- ☐ No
- ☐ Not Really
- ☐ Not interested

21. Would you be directly involved in the consultation phase of lean principles in your organisation

- ☐ Yes
- ☐ No
- ☐ Maybe

22. What would be your level of involvement in lean implementation on a scale of 1-5, (1-least,5-extensive)

1.	2.	3.	4.	5.

23. What lean techniques would be applicable in your organisation (Tick all the relevant options)

Push and Pull Mechanisms (Kanban)	<input type="checkbox"/>
Validated learning	<input type="checkbox"/>
Revised metrics	<input type="checkbox"/>
Just in Time (JIT)	<input type="checkbox"/>
KPI (Key performance indicators	<input type="checkbox"/>
Innovative accounting	<input type="checkbox"/>
SMART goals	<input type="checkbox"/>
Minimum Viable Product	<input type="checkbox"/>

Thank you for taking the time to participate in this study

Appendix 3:

Ethical clearance

8 July 2015

Mr Sabastian Naicker 200300703
Graduate School of Business and Leadership
Westville Campus

Dear Mr Naicker

Protocol reference number: HSS/0510/015M

Project title: Lean startup methodology. A case study of customer development at Invotech Incubator in KZN

Full Approval – Expedited Application

In response to your application received on 13 May 2015, the Humanities & Social Sciences Research Ethics Committee has considered the abovementioned application and the protocol have been granted **FULL APPROVAL**.

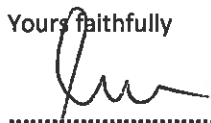
Any alteration/s to the approved research protocol i.e. Questionnaire/Interview Schedule, Informed Consent Form, Title of the Project, Location of the Study, Research Approach and Methods must be reviewed and approved through the amendment/modification prior to its implementation. In case you have further queries, please quote the above reference number.

PLEASE NOTE: Research data should be securely stored in the discipline/department for a period of 5 years.

The ethical clearance certificate is only valid for a period of 3 years from the date of issue. Thereafter Recertification must be applied for on an annual basis.

I take this opportunity of wishing you everything of the best with your study.

Yours faithfully



.....
Dr Shenuka Singh (Chair)
Humanities & Social Sciences Research Ethics Committee

/pm

Cc Supervisor: Prof S Cassim
Cc Academic Leader Research: Dr M Hoque
Cc School Administrator: Ms Zarina Bullyraj

Humanities & Social Sciences Research Ethics Committee

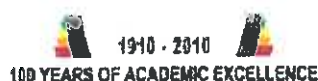
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