

https://dspace.org/

Adoption of lean startup principles by product teams in South African Fintechs

Bohloa, Reeme

2023
University of the Witwatersrand, Johannesburg
https://hdl.handle.net/10539/40778
Bohloa, Reeme. (2023). Adoption of lean startup principles by product teams in South African Fintechs [Master's dissertation, University of the Witwatersrand, Johannesburg]. WireDSpace.https://hdl.handle.net/10539/40778

Downloaded from a DSpace repository. https://dspace.org/

Adoption of lean startup principles by product teams in South African Fintechs

Student: Reeme Bohloa

Student number: 467077

Date: June 2023

A research paper submitted to the Faculty of Commerce, Law and Management, University of the Witwatersrand, in partial fulfillment of the requirements for the degree of Master of Management in the field of Digital Business

ABSTRACT

Purpose – This study examines the factors influencing the adoption of lean startup principles by product teams in South African Fintechs

Design/methodology/approach – Leveraging literature, the research proposes a conceptual framework that suggests six hypotheses. The hypotheses are empirically validated by applying partial least squares structural equation modeling (PLS-SEM) on survey data obtained from a survey that had 52 responses.

Findings – The results partially support the hypotheses and supports that Relative advantage has a positive relationship to Usefulness and that the Influence of Industry Peers has a positive relationship to Attitude.

Originality/value – The study is contributing towards research in a relatively new but rapidly growing industry in South Africa (Fintech).

Keywords - Lean startup, Fintechs, Product teams, Innovation, Build-measure-learn, Partial least squares

Paper type – Research paper

Table of Contents

LIST OF TABLES ..... *vi*

LIST OF FIGURES ..... *vii*

LIST OF ACRONYMS ..... *viii*

CHAPTER 1. INTRODUCTION 9

1.1 Statement of purpose 9

1.2 Background of the study 10

1.3 Research problem 13

1.4 Research objectives 16

1.5 Rationale 15

1.6 Delimitations of the study 16

1.7 Definition of terms 17

1.8 Assumptions 17

1.9 Chapter Outline 17

CHAPTER 2. LITERATURE REVIEW AND THEORETICAL FRAMEWORK 19

2.1 Introduction 19

2.2 Defining lean startup 19

2.3 The principles of lean startup 20

2.3.1 Hypothesis development and experimentation 20

2.3.2 Hypothesis testing by building a minimum viable product 22

2.3.3 Measure 24

2.3.1 Learn 25

2.4 ANALYTICAL FRAMEWORK 25

2.4.1 Theoretical Framework for adoption 25

2.4.1 Conceptual Framework 29

2.5 Conclusion of Literature Review 33

CHAPTER 3. RESEARCH METHODOLOGY 35

3.1 Research paradigm and approach 35

3.2 Research design 36

3.3 Data collection methods 36

3.4 Population and sample 37

3.4.1 Population 37

3.4.2 Sample 37

3.4.3 Sampling method 38
3.4.4 Sample size 39
3.5 The research instrument 40
3.6 Procedure for data collection 43
3.7 Data analysis strategies and interpretation 44
3.8 Quality Assurance 44
3.8.1 External validity 44
3.8.2 Reliability 45
3.9 Ethical considerations 45
CHAPTER 4. RESEARCH FINDINGS 46
4.1 Data screening 46
4.1.1 Missing data 46
4.2 Respondent demographics 47
4.3 Analysis and results 48
4.3.1 Analysis of data of build – measure – learn feedback loop 48
4.3.2 PLS - SEM analysis 49
4.3.2.1 Measurement Model 50
CHAPTER 5. Discussion of results 58
CHAPTER 6. Conclusion 61
6.1 Summary of findings 61
6.2 Limitations of the study 62
6.3 Recommendations for future research 62
6.4 Conclusion 63
REFERENCES 65

LIST OF TABLES

Table 1: Theoretical models for adoption 27

Table 2: Hypothesis derived from literature 43

Table 3: Respondent age.....47

Table 4: Respondent gender 48

LIST OF FIGURES

Figure 1: Conceptual framework 9

Figure 2: South African Fintechs – RMB (2018) 12

Figure 3:Theory of reasoned action (TRA) - Fishbein and Ajzen (1975) 27

Figure 4: Technology Acceptance Model (TAM) Davis et al, (1989).....28

Figure 5: Conceptual Framework - extended TAM.....30

LIST OF ACRONYMS

- MVP - Minimum viable product
- TAM - Technology acceptance model
- TRA – Theory of reasoned action
- TPB - Theory of planned behaviour
- DoI - Diffusion of innovation
- UTAUT - Unified Theory of Acceptance and Use of Technology
- UTAUT2 - Unified Theory of Acceptance and Use of Technology 2
- PU – Perceived Usefulness
- PEOU – Perceived Ease of Use
- IIP – Influence of Industry Peers
- RA – Relative Advantage

CHAPTER 1. INTRODUCTION

1.1 Statement of purpose

The purpose of this study is to examine the factors influencing the adoption of lean startup principles by product teams in South African fintechs. TAM is used as a theoretical framework to underpin the research about adoption of the lean startup principles. A conceptual framework is then developed which extends TAM by including two additional determinants of usage i) relative advantage ii) influence of industry peers (adapted from subjective norms). Individuals that work in product teams in South African fintechs will be surveyed to understand the factors that influence their adoption of the principles through the lense of an extended version of TAM (Figure 1).

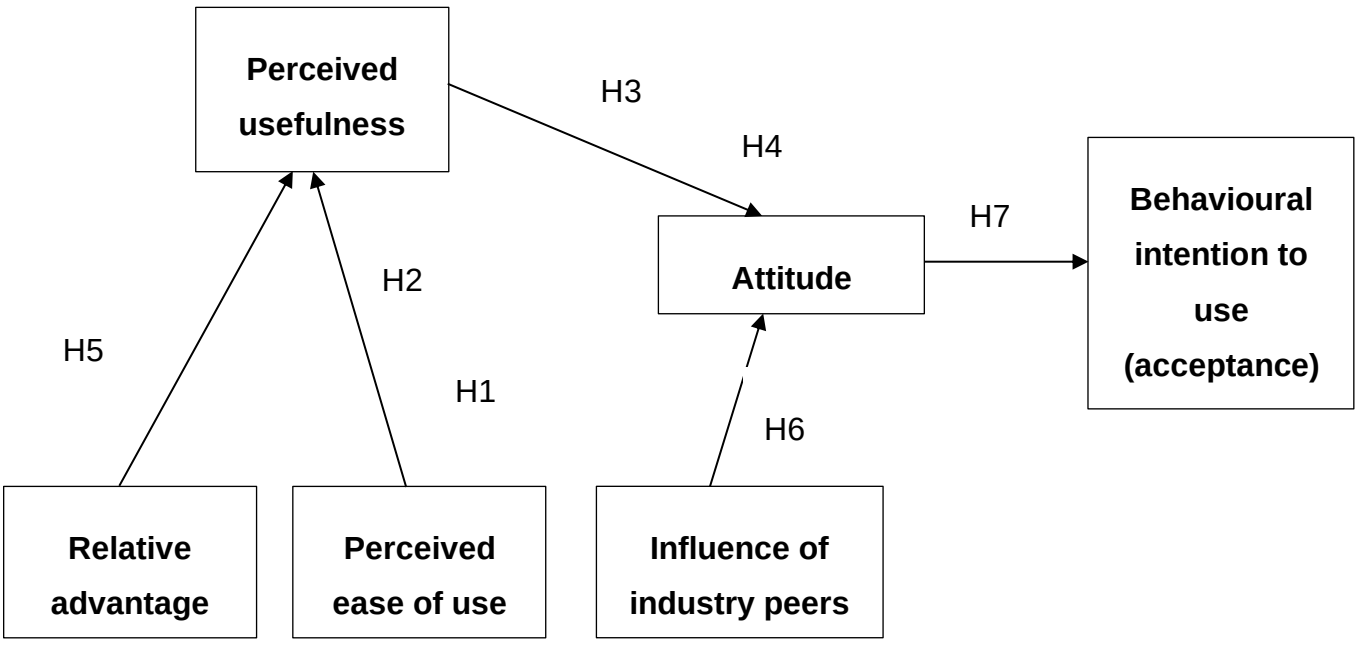


Figure 1: Conceptual framework

1.2 Background of the study

Startup landscape in Africa

Africa is currently experiencing a growth surge which is facilitating a lot of opportunities for new entrants. A report by Endeavor (2022) notes the following data about the continent:

- Africa's digital economy is expected to grow by 6 times to $712billion by 2050.
- Africa has high digital penetration with 2 in 3 Africans using the internet.
- GDP has tripled since the 1990s, making Africa one of the fastest-growing regions in the world.
- Africa is anticipated to have 1.6 billion working-age adults and a third of the world's population.
- Several African countries are still at the beginning of the digital payments S-curve indicating high growth potential in the sector of fintech.

Africa is home to several flourishing startups. The continent has produced a few unicorns. Unicorns are private companies with a valuation of above $1 billion. "Flutterwave got its horn in March at $1 billion; OPay in August at $2 billion; Wave and Andela the following month, at $1.7 billion and $1.5 billion, respectively; Andela in September raised at a $1.5 billion valuation; Chipper Cash in November at $2 billion. Meanwhile, Interswitch, the sole unicorn between 2019 and 2021, is worth $1 billion" (Kene-Okafor, 2021). The amount of startup innovation in Africa has resulted in increasing interest from investors such as venture capitals and private equity firms. The venture capital investment has grown more than 10 times between 2015 to 2021 with the investment reaching $4.3billion in 2021 (Accenture, 2022).

Fintech landscape

Fintechs have been the quickest growing and most invested in sector in African startups. One of the key drivers of this growth has been the adoption of mobile phones across the continent, which has enabled more people to have access than ever before (KPMG, n.d.). Fintech (shortened term for financial technology)

is a term used to describe innovative financial solutions that leverage information technology and although not exclusively, it is a term often used to describe startups which deliver these products and services (Puschmann, 2017). A report by RMB (2018) describes fintechs as “entrepreneurial disruptors who have homed in on a consumer pain-point and have developed a simple solution which eliminates the friction experienced in traditional financial services processes” (RMB, 2018, p. 11). As a result, fintechs are disrupters and are synonymous with innovation because they find new ways to solve customer problems by leveraging modern technologies. Although considered disruptors to traditional players, success in this market is not an inherent feature of disruptive innovation theory, therefore some innovative fintechs will succeed and some will fail (Zalan and Toufaily, 2017).

The key markets for fintechs as of 2021 remained Nigeria, Kenya, and South Africa (KPMG, n.d.). In terms of venture capital funding, Nigeria, South Africa, and Kenya have received the most funding (Kene-Okafor, 2021). Therefore, the research report will be based in South Africa due to the robust Fintech landscape that is highly competitive and continuously growing. A report by RMB (2018) notes that there are several players in various Fintech sub-sectors (image 2).



Figure 1: South African FinTech landscape (Source: Amended from Venturebum.com, 2018, RMB).

Figure 2: South African Fintechs – RMB (2018)

In South Africa, fintechs and the more traditional financial institutions are in fierce competition with each other. Fintechs are seeing opportunities to use modern technologies create solutions for markets that the larger financial institutions have often overlooked. The fintechs are observed to be tackling problems related to remittances and payments to create financial inclusivity, provide accessible solutions for the unbanked and make payments (transacting) simpler and more affordable (RMB, 2018). South African fintechs such as Mukuru and Mama Money are examples of startups that have provided solutions for migrant workers that need to send money back home across the board at affordable rates.

This problem of more affordable cross-border payments was long overlooked by traditional banks. It is startups like these that have researched and understood

the market opportunities and found gaps to serve those that have historically been excluded.

Due to their resourceful nature and ability to quickly spot and respond to gaps in the market, fintechs can disrupt the traditional organisations such as the large banks and insurers. However, it is unlikely that they will wipe these organisations out completely. Coetzee (2018) notes that it is unlikely for new incumbents to completely wipe out the traditional South African banks due to i) stringent regulation that makes it difficult for new entrants ii) the wide network and specialist skills that the banks have iii) the security and privacy that the traditional banks can give which the new incumbents cannot.

The analysis of the startup and specifically fintech landscape in South Africa is indicative of a market that is ripe for new entrants that bring in innovative products, hence the decision for the study to be conducted in South Africa.

1.3 Research problem

No matter the industry, the life span of business units will end and the markets which businesses operate in will disappear (Bower and Christensen, 1995). This reality has not changed. If anything, the business lifecycle of most business has been shortened as a result. Today's business leaders are concerned about how the speed of new technologies entering the market are disrupting and rendering their products obsolete, thus feeling the pressure to stay ahead of the disruption by innovating on current products, launching new products, seeking growth in new markets and (Reis, 2017).

With this level of increased uncertainty, organisations must become better than ever at adapting to changing market conditions and customer needs to survive and continue to be sustainable.

"The amount of time a company can count on holding on to market leadership to exploit its earlier innovations is shrinking, and this creates an imperative for even the most entrenched companies to invest in innovation" (Reis, 2011, p. 34). Although this disruption can impact organisations of all sizes, startups which are

still trying to establish a product market fit and define their business model (Depmsey, 2018), are inherently more vulnerable to failure. However early-stage startups also have the advantage of agility to respond to changing market conditions. This is an advantage that established corporates and growth stage startups can struggle to leverage. In his book, Reis (2017) notes that hyper scaling startups can run the risk of losing their inherent entrepreneurial culture and the agility to respond to changing market needs. This could be due to scaling too quickly therefore needing more stringent processes and governance to manage the growing size of the organisation.

With the context of the competitive nature of the landscape in mind, it has become an imperative that organisations such as Fintechs find better ways to innovate by creating solutions that address customer needs quicker than ever before to reduce risk of failure. Frameworks such as the lean startup were developed to help startups reduce the risk of failure by introducing an iterative approach of building products that is informed by customer needs especially in a market of high uncertainty (Reis, 2011). The use of the framework has historically been synonymous with early-stage startups that are trying to validate their business model and establish product market fit. However, as the methodology has scaled, it has been adopted by growth stage startups that have a defined product but need to sustain product innovation and find their next horizon of growth and large enterprises that need to find new ways to remain relevant in an everchanging market. GE and Dropbox are examples of more established organisations that have been known to leverage and benefit from using the principles of the lean starup to promote intrapreneurship (Reis, 2017).

With a market dictating that organisations innovate or cease to exist, the product teams in these organisations have a mammoth task. There is growing importance on how product teams successfully deliver innovative products to market, and as a result there has been increasing research on the methods and creativity product teams leverage to create these products (Akgun & Keskin, 2021). This growing importance is due to organisations understanding that to survive in a market that is continuously changing there is a need to create products that set them apart from the competition and are aligned to market needs (Bai et al, 2017). For

startups, their entire business is initially built around one product idea. An example of this is Airbnb. Their entire business for several years was around perfecting their home sharing product. The business only expanded into other areas such as curating experiences years later. With this mounting pressure on product teams to create innovative products, they are often seeking better ways to understand what problems to solve which will result in amazing products that the market will value.

1.4 Research Objectives

Therefore, the research has the following objectives:

Main objective: To understand the factors influencing the adoption of lean startup principles by product teams in South African Fintechs

Sub-objective 1: To understand the principles of lean startup product teams can apply in their product development process to enhance product innovation.

Sub objective 2: Assess the adoption of the lean startup principles by product teams through TAM.

The elements of TAM that will be assessed as part of sub-objective 2 are perceived ease of use, perceived usefulness, and attitude.

1.5 Rationale

As per the context provided in the research problem, fintechs in Africa and South Africa continue to be the one of the highest invested fintech sector on the continent (African private equity and venture capital association, 2022). This investment is indicative of the projected growth trajectory of fintechs. South African fintechs have found ways to solve problems for customers which have often been overlooked while using emerging technologies. An example of this is Naked insurance which provides short term insurance which uses artificial intelligence for its underwriting process, thus reducing the fees of the customer

(Naked, 2021). With this rapid growth of the sector, new entrants entering the market and increasing investor interest, there is mounting pressure on fintechs to continue to create products that solve the needs of customers and delight the customer in ways that the larger more rigid organisation have failed to. The research will contribute to this regard by exploring how fintechs can continue to achieve product innovation and remain competitive by leveraging lean startup principles.

Despite multiple examples of South African fintechs creating innovative products and attracting investor interest, there has been limited research on the successes, failures and challenges faced by fintechs in the country. The literature on the adoption of technology development frameworks such as lean startup methodologies have largely been focused on countries that have dominated the technology landscape by producing technology giants such as Apple and Meta. However, the trends of where investor money is flowing on the African continent indicates that the Fintech sector is on an upward growth trajectory. Thus, based on this trend, there should be a growing interest to research and better understand a sector that will only continue to contribute positively towards the economy and towards society through creation of employment. This research will create visibility on a sector which is not well documented compared to more mature sectors such as banking or insurance.

1.6 Delimitations of the study

This study will be exploring adoption of lean startup principles by product teams in South African fintechs. Therefore, the following will not be included in the study:

i) Individuals in roles which do not fall within a product development team.
ii) Organisations that are not in the fintech industry
iii) Organisations outside of South Africa

1.7 Definition of terms

Lean startup: A methodology that provides a scientific approach for startups to create products that customers need faster (Reis, 2011).

Product teams: A team that is responsible for understanding customer needs and creating solutions that solve those needs (Aha, n.d.).

Fintech: A startup that creates innovative financial solutions by leveraging technology (Puschmann, 2017)

Startup: An institution designed to deliver value in the face of high uncertainty (Reis, 2011)

1.8 Assumptions

- There will be a broad enough population of individuals working in South African fintechs to sample.
- Respondents to the questionnaire will be willing and transparent to share their product development process.
- Respondents of the questionnaire will be familiar with various product development methodologies including lean startup.

1.9 Chapter Outline

Chapter 1 highlights the purpose of the study and outlines why the area of research is meaningful. The chapter provides insight into the industry being studied and the common terms related to that industry to ensure common understanding. Chapter 2 reviews the existing literature on lean startup principles. The chapter then examines a theoretical framework (TAM) to underpin the study and lastly, proposes a conceptual framework (an extended TAM). Chapter 3 covers the research methodology. The chapter discusses the quantitative research approach and the research design. The chapter continues to examine the data collection process, sampling methods and the research instrument. Chapter 4 is the analysis of the research using PLS – SEM. The

results of the analysis are then discussed in chapter 5. Chapter 6 provides a summary of the paper and makes recommendations on for future studies.

CHAPTER 2. LITERATURE REVIEW AND THEORETICAL FRAMEWORK

2.1 Introduction

The chapter will start by reviewing existing literature about lean startup principles and organisations (startups and enterprises) may integrate the principles into their way of work to enhance innovation. The literature review will focus on unpacking the lean startup principles of validated learning, building MVPs, and measuring. Thereafter, several theoretical frameworks that underpin adoption will be examined. Finally, a conceptual framework will be proposed which will be an extension to TAM.

2.2 Defining lean startup

The concept of lean startup started in the early 2000s. It was developed into a framework and popularised by Silicon Valley entrepreneurs Steve Blank and Eric Ries. Blank (2013), explained the lean startup as a methodology that can be used to de-risk starting a new organisation as it anchors on understanding customer needs, experimenting, learning, and iterating based on customer feedback.

Eric Reis went on to popularise the framework in his bestselling book “the lean startup”. Reis had partially been influenced by his mentor Steve Blank who in 2004 had already started preaching the customer development methodology as being paramount in the success of startups (Reis, 2011). The customer development methodology is explained as helping startups to seek an understanding of customer needs and creating solutions that can fulfil those needs which in return helps reduce the risk of building a product that customers will not use (Blank, 2013).

Another influence on the concept of the lean startup methodology was the lean manufacturing process which originated in Japan and is most synonymous with the Toyota production system. The basic concept of lean manufacturing is based on the principles of maintaining flow in the production system to adapt to changing

demand while eliminating waste (Htun et al, 2019). Reis (2011) acknowledges that the lean startup concept was adapted from the principles of lean manufacturing which leverages the individual workers knowledge and their creativity, shrinking batch sizes, just-in-time production, and accelerated throughput. The lean startup methodology was introduced as a tool for entrepreneurs in early-stage startups to validate early on whether their business idea had product market fit (Reis, 2011). Reis (2011) defines a startup as being an organisation that is designed to create a new product or service under extremely uncertain circumstances. Due to the increased uncertainty organisations face and the rapid speed of change, this definition of a startup can be applied to any size organisation at any stage of the business lifecycle. There is an increasing reality that any individual, working in any size organisation will be faced with the challenge of creating meaningful and innovative products (or services) in the face of extreme uncertainty.

2.3 The principles of lean startup

The core of the lean startup model is the feedback loop of build, measure, and learn (Reis, 2011). The purpose of the build, measure and learn feedback loop is for startups to turn their assumptions (hypothesis) into tangible insights that will help them create better products. This feedback loop is intended to encourage startups to rapidly learn whether they are creating the best solutions and to pivot should their hypothesis be disproven. The build, measure and learn feedback loop is like the concept of discovery-driven planning. McGrath and McMillian (1995) describe discovery-driven planning as finding ways to validate assumptions into knowledge, and evolving the plan as new data is uncovered.

2.3.1 *Hypothesis development and experimentation*

Contrary to traditional business thinking that dictates that founders must have a comprehensive business plan upfront, Blank (2013) suggests that the initial business plan should be a few hypotheses that need to be tested to prove their validity. A hypothesis should be clear, guided by the startups vision, and have an outcome that it is predicting the expected result (Reis, 2011). Hypothesis-based

thinking can also be leveraged by product teams when assessing new product development. The concept of hypothesis testing requires that product teams view product or feature development as an experiment, which if invalidated they will deem it as a learning and pivot (Sherperd et al, 2020). With hypothesis testing, product teams should seek to understand what the customer need is, whether the customer would adopt the proposed solution and whether the proposed solution addresses the customers need (Reis, 2011). The customer development framework suggests a three-step process that product teams should follow with regards to hypothesis driven development; first develop a hypothesis, test the hypothesis, and then use the findings from the test to re-evaluate the hypothesis (York and Danes, 2014).

Hypothesis testing can take a more scientific approach. According to York and Danes (2014) there are two types of hypothesis testing; frequentist-based hypothesis which is a formal statistical process and Bayesian inference which prescribes how a hypothesis should be evaluated based on prior and new information. However, the data requirements to achieve both scientific types of testing can be unrealistic for startups which often have very small product teams.

In his customer development model, Blank (2007) suggests that hypothesis testing can take more of an informal and less scientific approach of talking to customers to validate the hypothesis. This type of informal testing enables product teams to learn and validate their assumptions quickly which is helpful when faced with time constraints. However, relying on subjective and ambiguous information generated from informal hypothesis testing can lead to bias.

Schade and Koellinger (2007) as cited in York and Danes (2014) suggest the following biases that product teams may become susceptible to when testing their hypothesis:

- Selection bias: Not selecting a representative sample of the target audience but instead testing with specific customers who will confirm the hypothesis. This can be overcome by ensuring there is representation within the target audience that is being tested.

- Representative bias: Selecting from a small, non-diverse audience that does not represent the target market. This can be overcome by using market data to inform the representation of the audience the product team will test with.
- Acquiescence bias: Participants giving answers that they think the product team wants to hear during the test. This may be avoided by making it clear to the participant that there are no right or wrong answers, but the intention is to understand their perspective.
- Confirmation bias: Interpreting information in a way that confirms the hypothesis of the product team. This can be avoided by utilising open-ended questions which focus on understanding the problem rather than the solution. For example, instead of asking the participant if they would like a feature that would allow them to make cross-border payments, the question should be positioned to understand how the participant sends money to their friends or family that do not live in the same country as them and what pain points (if any) they experience when doing this.
- Overconfidence bias: Overestimating the suggestions received from a customer. An example of this is if during an interview the participant explicitly says they would want a feature and describes exactly how that feature should work and the product team take that feedback as confirmation of exactly what solution to create. This can be avoided by interviewing a few participants and observing whether common themes which emerge from the responses.
- Optimism bias: The product team thinks they cannot experience failure and therefore ignore the results from the hypothesis testing.

2.3.2 *Hypothesis testing by building a minimum viable product.*

Hypothesis testing can be achieved through putting a minimum viable product (MVP) in the hands of the target customer. “An MVP is an experimental object that allows for empirical testing of value hypotheses” (Munch et al, 2013, pp 2). According to Reis (2011), the MVP is a version of a product which enables a

product team to learn as much as possible about their hypothesis from customers with the least amount of effort. The concept of hypothesis testing using an MVP is based on the reasoning that any solution a product team comes up with is only a best guess of what a customer needs and only until the customer starts using the solution within a real-life context can they give authentic feedback. This concept of not guessing whether there is product-market fit, and rather going out to learn in the real-world context that the customer will be using the product is adapted from one of the core principles of lean manufacturing “genchi gembutsu” (Reis, 2011).

The literature on the concept of an MVP does not prescribe what the minimum requirement of an MVP should be. It could be a low-fidelity prototype or even a simulation of an experience of a service. The lack of guidelines on what the minimum requirement of an MVP should be is a gap in the literature and in the lean startup framework. There are some practitioners that argue that a prototype cannot be defined as an MVP. Calabretta & Kleinsmannas (2017) as cited in Sheperd & Gruber (2021) defines a prototype as a visualisation of information that can be used to turn intangible ideas into tangible concepts. Therefore, if the prototype does not enable product teams to derive insights and learnings from it, it becomes unusable. However, if the prototype enables product teams to share their idea with a customer and the customer can understand the concept well enough to give feedback and insights, then the prototype can be considered an MVP.

The concept of an MVP can create a dilemma for some product teams, as the speed to put something in the hands of a customer in order to learn can supersede the quality of the MVP (Pantiuchina et al, 2017). This dilemma can also be caused by product teams releasing incomplete products with missing features thus impacting the intended experience of the product. That is, if the MVP has major software defects which cause it to break when a customer is using it, then it is difficult for customers to provide valuable feedback on their experience. Therefore, although the MVP can take many forms, the speed to release it should be balanced with releasing a version that is a usable iteration of the product in order to gain tangible insights.

On the other hand, releasing an MVP that has missing features can help product teams validate whether customers even request those planned features and this feedback can start to guide the prioritisation of the product roadmap. According to Sheperd & Gruber (2021), any features that are added to the MVP that do not aid the team to learn can be considered a waste of resources. Product teams should continue to validate, review, and adjust their hypothesis and iterate on the MVP based on customer feedback until their proposed solution addresses the customer needs, which is when they will know they have achieved product market fit (Figueiredo de Faria et al, 2021). Even when the product-market fit is achieved, the process of learning from and co-creating with customers is an ongoing one for a product to achieve sustainable growth.

2.3.3 *Measure*

The measure phase of the build, measure, learn feedback loop is intended for product teams to determine whether they are making tangible progress on their goals and toward what they set out to achieve in their business plan (Reis, 2011). Releasing the MVP enables product teams to gauge the progress they are making on key metrics they set out in their business model (Reis, 2011). Having the baseline gives product teams an opportunity to see which levers they need to adjust to achieve the growth objectives they had set out in their growth model.

Adjusting these levers could come in the form of developing a new hypothesis that needs to be tested and iterating on the MVPs. Product teams that are experimenting and iterating based on their learnings should see a positive impact on their growth model goals (Reis, 2011).

Running a series of experiments and measuring the impact is a good way to learn. There are several experiments teams can run in order to learn. An example is A|B testing or Split test which is used when different variations of a product are given to two different audiences and insights are derived from how each audience interacts with the product (Reis, 2011). An example of a split test (AB test) could be giving two different audiences a different version of a website's home page to test which design resonates with users the most. AB testing allows product teams to learn whether what they deem is important actually matters to users (Reis,

2011). Product teams should be mindful of these three common mistakes outlined by Gallo (2017) when measuring the impact of an experiment i) Jumping to a conclusion early without allowing the experiment to run its course ii) Not being clear upfront on the metrics to measure iii) Running the experiment once and not considering the need to retest to mitigate any false positives.

To learn effectively, product teams need to ensure they are tracking metrics that will give them the most insight on how customers are experiencing their product and if they are finding it valuable. Reis (2011) suggests that startups should be mindful that the metrics they are tracking are actionable, accessible, and auditable.

2.3.4 *Learn*

With the use of hypothesis-driven planning, releasing MVPs to get feedback from the market, and tracking actionable metrics, product teams can gain insights into the value the product is creating for customers and the growth of the product.

The learning that comes from this is referred to as validated learning. Validated learning is uncovering valuable learnings about the startups current and future business prospects (Reis, 2011). The validated learning that comes from testing the hypothesis of a business model or product idea, enables product teams to decide whether to pivot or persevere (Bajwa et al, 2017). The sustainable success of a startup is about aligning efforts on products and features that create value and pivoting if those efforts to not yield results that contribute towards growth (Reis, 2011). Blank (2007) suggests that the concept of this feedback loop is ongoing as with each new decision (in this case pivot or persevere), a new set of hypotheses are generated which need to be tested and evaluated.

2.4 Analytical framework

2.4.1 *Theoretical Framework for adoption*

Due to the increasing uncertainty facing organisations, organisations have started to look for ways to become more competitive and innovative. Part of this

innovation is derived from the solutions and products that are released to the market which enable organisations to gain an advantage over the competition. This has put intense pressure on the product teams to continue to come up with the best products that will enhance business success. There are several frameworks that product teams can adopt to drive entrepreneurial thinking and innovation. For the product team to derive the full value from a framework such as the lean startup, they need to adopt and integrate the principles into their product development process. Product teams that are seeking better ways to innovate do not always find it easy to adopt and integrate frameworks such as the lean startup into their way of work. Ghezzi (2018) outlines that some teams have highlighted they underestimated the complexity of integrating the lean startup methodology in their way of work, specifically in the following areas:

i) defining MVPs; ii) identifying first users of the MVP; iii) identifying what to test and which experiments to run; iv) missing other market opportunities as result; v) extracting data about the startup's source of competitive advantage.

A few theoretical frameworks have been explored and suggested by researchers to analyse the factors that influence adoption (Table 1). These frameworks have been used in several fields such as health care, psychology, and education to name a few.

Theoretical model	**Authors**
Theory of reasoned action - TRA	Fishbein and Ajzen (1975)
Theory of planned behaviour - TPB	Ajzen (1991)
Technology acceptance model - TAM	Davis, Baggozi and Warshaw (1989)
Diffusion of innovation - DoI	Rogers (1995)

Unified Theory of Acceptance and Use of Technology - UTAUT	Venkatesh, Morris, Davis and Davis (2003)
Unified Theory of Acceptance and Use of Technology 2 – UTAUT2	Venkatesh, Thong and Xu (2012)

Table 1: Theoretical models for adoption

Theory of reasoned action (TRA) - Fishbein and Ajzen (1975)

The theory of reasoned action is a framework based on psychology. The theory of reasoned action operates on the assumption that people behave in a rational manner and use all the information available to them to decide.

The theory suggests that people's behaviour is influenced by their intention to perform that behaviour and that the intention is influenced by two factors; i) their attitude towards that behaviour ii) their subjective norms which is how the rest of society such as family, friends, etc perceive that behaviour (Acharya and Mekker, 2022). Theory of reasoned action only takes into consideration a single action behaviour instead of repeated behaviour.

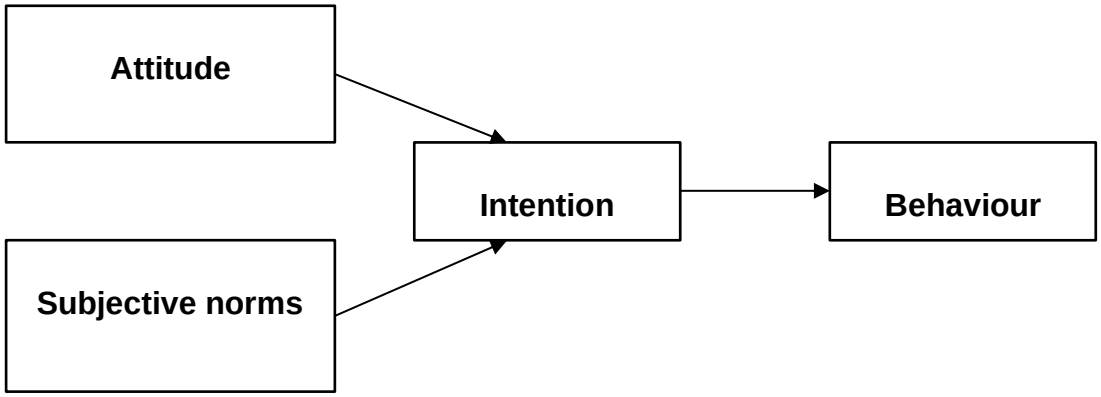


Figure 3:Theory of reasoned action (TRA) - Fishbein and Ajzen (1975)

The authors of TAM used the theory of reasoned action (TRA) as the foundation to their framework as it was a theory that was already being used to understand

adoption in other fields such as healthcare. The authors of TAM extended TRA with variables that could help bring an understanding of adoption in the context of IT (Holden and Karsh, 2010).

The technology acceptance model (TAM) was developed out of the need to understand why employees in an organisation do not use information technology (IT). The employees were thought to not be using IT because they could not accept it. Therefore, the model was formed under the assumption that for the employees to start using IT, they first need to accept it, and to increase their acceptance, the factors influencing their intention would have to be well understood (Holden and Karsh, 2010). The basis of TAM rests on economic, utilitarian, and attitudinal grounds.

It proposes that an individual's intention to use technology is predicted and influenced by their perception of the technology's usefulness and its simplicity (Awa et al, 2015). TAM states that perceived ease of use of the technology (PEOU) and perceived usefulness (PU) of the technology determine the attitude the person will have towards the technology which will impact their intentional behaviour to adopt the technology and ultimately whether they will end up using the technology (Acharya and Mekker, 2022).

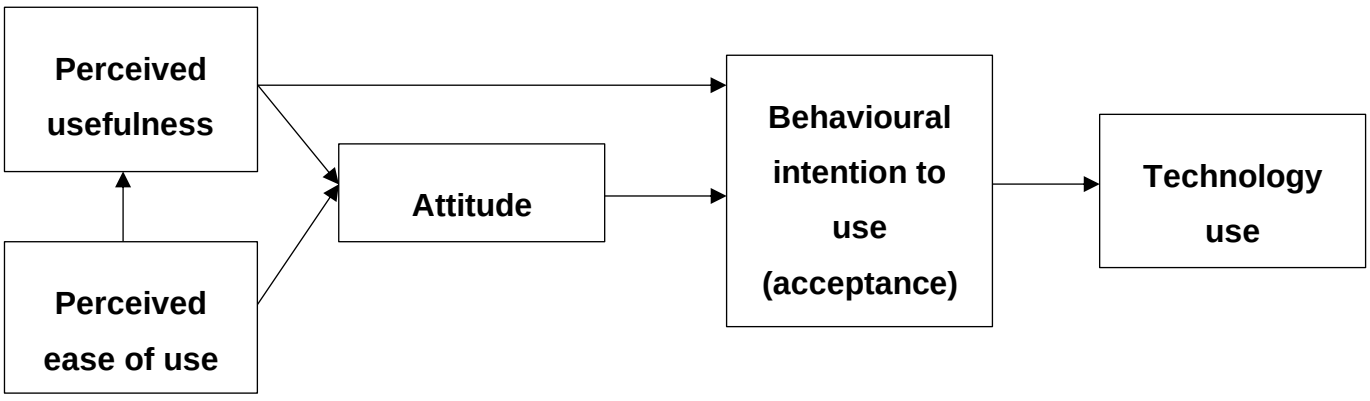


Figure 4: Technology Acceptance Model (TAM) Davis et al, (1989)

TAM has been referred to as the most influential and most widely used theoretical framework to analyse the adoption of IT (Benbasat & Barki, 2007). The appeal of TAM as a framework has come from its robustness, scalability (can be applied in multiple contexts), the fact that it is easily understood and its ability to predict the use of technology (Lee, 2009). This robustness and scalability make it an attractive framework for this study as the framework will be used in a different context of adoption of technology development frameworks and not IT adoption (as per previous studies). TAM focuses on the adoption of technology in the context that the usage is voluntary (Mollick et al., 2023). This voluntary usage makes TAM appropriate to use in this research because there are many product development frameworks on the market, and it is at the discretion of product teams to decide which one to use to yield the results they are seeking.

According to Glavee-Geo et al. (2017), individuals and organisations in both developed and developing countries have used TAM to predict the adoption of technology.

While TAM has had wide application and empirical validation, its narrow focus on perceived usefulness and perceived ease of use has been noted to neglect other factors such as psychology, social and interpersonal variables that may influence adoption (Awa et al, 2015). To enhance its explanatory and predictive abilities in the context of the adoption of technology development frameworks (such as lean startup) this study will propose extensions to TAM to derive the conceptual framework.

2.4.1 *Conceptual Framework*

The purpose of this research is to explore how product teams in fintech can adopt lean startup principles to enhance innovation. Although the application of TAM is based on the adoption of technology, in this study the term “technology” will be extended beyond hardware, to encompass frameworks used to develop the technology. For the purposes of this study, the TAM framework will be extended with the variables of relative advantage and influence of industry peers to form the conceptual framework (Figure 5).

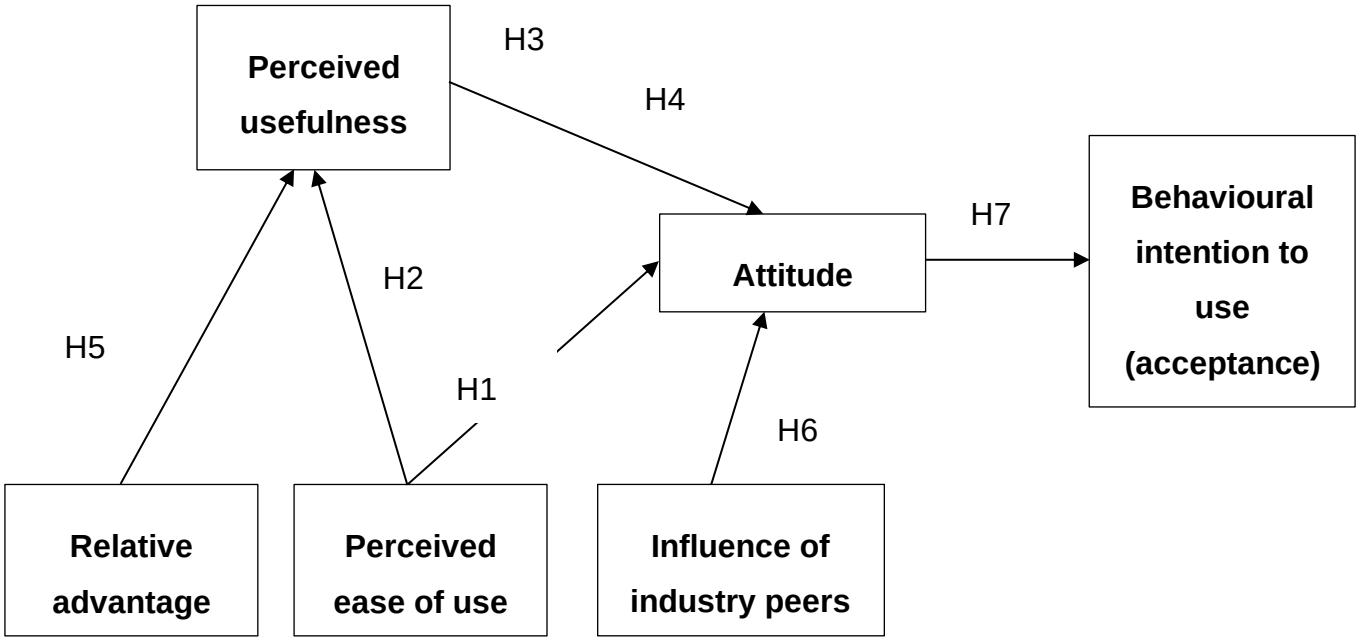


Figure 5: Conceptual Framework - extended TAM

Perceived ease of use

TAM defines perceived ease of use as the extent that a person feels that using a technology will be free of physical and mental load (Davis et al, 1989 as cited in Wallace and Sheetz, 2014). Davis (1989) suggests that if a technology is too complex to use or understand, people would be less likely to use it even if they think it is functional. Crowne (2002) as cited in Mkpojiogu et al (2019) states that most products fail due to not achieving product market fit caused by not having rigorous processes and frameworks to design and validate the product assumptions. Coleman & O'Connor (2008) as cited in Mkpojiogu et al (2019) go on to suggest that startups often do not have sufficient resources to invest in finding the best development frameworks thus resulting in partial or poor adoption of these frameworks. Therefore, finding frameworks that are easy to understand without investing too many resources such as training, has a positive influence on deciding which product development framework to use. Thus, the following may be hypothesis from the TAM theoretical framework by Davis et al, 1989:

H1: Perceived ease of use has a positive effect on the attitude product teams have toward adopting the lean startup methodology.

H2: Perceived ease of use has a positive effect on product teams' intention to adopt the lean startup methodology.

Perceived usefulness

TAM defines perceived usefulness as the extent to which a person feels that using technology will help them perform their job better (Davis, 1989 as cited in Wallace and Sheetz, 2014). Startups operate in a lot of uncertainty. This uncertainty is a result of the increasingly changing market landscape and consumer needs. For new entrants trying to establish product-market fit and nurture a new business through continuous product innovation that delights the customers is vital for survival and sustainable growth. Thus, if individuals that work in a product team feel that the lean startup methodology is useful in helping them create better products, they are more likely to have a positive attitude towards using the methodology. Thus, the following may be hypo**thesis from the TAM theoretical framework** by Davis et al, (1989):

H3: Perceived usefulness has a positive impact on the attitude that product teams have toward using the lean startup methodology.

H4: Perceived usefulness has a positive impact on the product team's intention to adopt the lean startup methodology.

Relative advantage

Relative advantage is a variable that is being introduced to extend TAM for the relevance of this study. The variable of relative advantage is borrowed from the diffusion of innovation theory by Rogers. Rogers (1995) as cited in Rogers (2002) defines diffusion as the process through which (1) an innovation (2) is communicated through certain channels (3) over time (4) among the members of a social system. Rogers (2002) goes on to suggest that the factors that determine the diffusion of innovation are i) relative advantage ii) triability iii) complexity iv) compatibility and v) complexity. Relative advantage is defined as the degree the

person using the innovation perceives the innovation to have an advantage (Rogers, 2002). The concept of relative advantage is relevant in the adoption of product development frameworks such as lean startup as they are adopted on the premise that it is going to help the startup create superior products to the rest of the market. Therefore, there is a perceived advantage that is anticipated. If product teams perceive the lean startup principles to have the potential to help them develop more innovative products, this will influence them into believing that adopting the framework as part of their product development process will be useful to them. The following hypothesis may be adapted from Rogers (1985).

H5: Relative advantage has a positive impact on product team's perceived usefulness of the lean startup methodology.

Influence of industry peers

The influence of industry peers is a variable that is being introduced to extend the TAM model for the purpose of this study. It is adapted from subjective norm suggested by Ajzen (1991) in the theory of planned behaviour.

Subjective norm is defined as the influence that those close to a person such as family and friends have on their behaviour (Waris et al, 2022). Al - Swidi et al. (2014) propose that subjective norms reveal how individuals feel they would be perceived by others if they behave a certain way. This study suggests that the concept of subjective norms can be extended to include how industry peers influence each other when it comes to technology development frameworks. The concept of referring to the experience of industry peers to assess how to feel about a framework is common for product teams, startups, and organisations. An example of this influence of peers in the same industry is how Silicon Valley companies have impacted technology companies around the world. "Silicon Valley is the unquestionable global hub of entrepreneurship and innovation in a full spectrum of industries including software, information technology, Internet, social media, and biotechnology" (Stephens et al, 2019, p. n.a.). This influence extends beyond Silicon Valley to any unicorn startup. Frameworks such as the Spotify model have been adopted around the world as startups and large organisations perceived it would be useful to their product development practices

based on the success Spotify had with using the practice. This leads to the following hypothesis adapted from Ajzen (1991):

H6: The influence of industry peers has an influence on the attitude that product teams have toward the lean startup methodology

Attitude

Davis (1989) defines attitude as the positive or negative feelings that a person has toward using technology. For this study, the attitude will refer to the attitude the product teams feel towards adopting lean startup principles. This leads to the following hypothesis adopted from TAM (Davis, 1989):

H7: A positive attitude towards the lean startup methodology has a positive effect on the intention to use the methodology.

Behavioural intention to use

The actual use of the technology is the key measure of success of whether someone has accepted the technology (Davis, 1989). This usage can only be assessed when the technology has been integrated into the organisation. In the absence of this post-deployment measure, most studies have formed a correlation between intention to use and actual usage (Acharya and Mekker, 2022). For this study behavioural intention to use is the degree of the intention of product teams to adopt the lean startup principles.

2.5 Conclusion of Literature Review

The chapter delved into understanding the existing literature on the principles of lean startup. Product teams may benefit from validated learning, testing their hypothesis by building MVPs, measuring their progress and impact by using actionable metrics, and using these insights to make decisions on whether to continue the same path or to pivot. To benefit from the lean startup framework, product teams would have to adopt the principles as part of their product development process. To understand the likelihood of product teams adopting the framework, several theoretical frameworks were explored. Due to its

extensive usage, validation, relevance and scalability, TAM is used in the study to understand the factors that influence adoption. TAM is extended by two variables of relative advantage and influence of industry peers (based on subjective norm). The following hypothesis have been proposed:

H1: Perceived ease of use has a positive effect on the attitude product teams have toward adopting the lean startup methodology.

H2: Perceived ease of use has a positive effect on product teams' intention to adopt the lean startup methodology.

H3: Perceived usefulness has a positive impact on the attitude that product teams have toward using the lean startup methodology.

H4: Perceived usefulness has a positive impact on the product team's intention to adopt the lean startup methodology

H5: Relative advantage has a positive impact on product team's perceived usefulness of the lean startup methodology.

H6: The influence of industry peers has an influence on the attitude that product teams have toward the lean startup methodology.

H7: A positive attitude towards the lean startup methodology has a positive effect on the intention to use the methodology.

CHAPTER 3. RESEARCH METHODOLOGY

This chapter discusses the methodology used in this study to answer the research objective. The chapter will start by outlining the approach of a quantitative study and how the research instrument was designed to collect data. The chapter will detail the population and sample that has been surveyed for the study and discuss the decision around population and sample size. The chapter will conclude by discussing how the data was analysed and how the quality of the data was observed.

3.1 Research paradigm and approach

The research takes on a positivist research paradigm as it is characterised by a scientific approach of measuring a set of hypotheses to find causal explanation of what would influence product teams to adopt a methodology in order to enhance their innovation.

The research followed a deductive research approach. A deductive research approach starts with a theory or hypothesis which is tested, and data is collected (Mark et al, 2019). The research started with a set of hypotheses that were developed from literature. The hypotheses were then tested within the context of product teams working in South African fintechs. Some of the hypothesis from the research were confirmed while others were could not be fully supported.

The research methodology used was quantitative. Wang (2010) defines quantitative research methodology as being characterised by positivism, measurement, and statistics.

The research approach taken for this study was quantitative for the following reasons:

i) The research intends to understand the factors that would influence product teams to adopt lean startup principles as part of their product development framework to enhance innovation.

ii) The research intends to understand the factors that influence how product teams assess the usefulness of the lean startup framework. The research assesses whether the elements of the conceptual framework have a positive influence on whether product teams will deem lean startup methodology as useful.
iii) The research intends to understand what the predictors of the adoption of the lean startup principles will be.
iv) The research intends to test the conceptual framework against real-life data. The research will test whether the hypothesis derived from theory can be applied to the identified sample population of product teams in a developing market (South Africa) where the adoption of technology development methodologies has not matured.

3.2 Research design

The research design that was used for this study was a mono method quantitative study using a survey as a single collect data collection technique. “Survey research uses scientific sampling and questionnaire design to measure characteristics of the population with statistical precision. It seeks to provide answers to such questions as "How many people feel a certain way?" and "How often do they do a certain behaviour?" (Sukamolson, 2007). As the research intended to understand which factors influence adoption of lean startup principles, a survey allowed for a scientific approach to test the hypothesis. The use of surveys was appropriate and synonymous with positivism and deductive research.

3.3 Data collection methods

To collect data for the study, a self-administered questionnaire using an online questionnaire tool (Qualtrics) was used. Self-administered questionnaires are questionnaires that enable the respondent to fill out (answer) themselves (Sukamolson, 2007). The use of self-administered questionnaires enabled quicker collection of data as the respondents were able to complete the survey as soon as they received the link and the answers to the survey were available

immediately upon them completing. The use of Qualtrics to administer the questionnaires made it more efficient to collate the data received from respondents into one central and secure repository. With most South African Fintech's having a remote first policy, the use of self-administered questionnaires enabled access to respondents regardless of where the employee is located. To ensure true results, it was important that respondents answer questions honestly and objectively which the self-administered questionnaire allowed as they respondent was taking it alone without any interference and influence.

3.4 Population and sample

3.4.1 *Population*

The target population of the study was individuals working in South African fintechs. Without a central database available that keeps a record of the number of people working in the industry, it is difficult to accurately quantify how large the population size is. According to LinkedIn (n.d.), established South African fintechs such as Ozow employs 50 -200 employees and Yoco employs approximately 300 people.

3.4.2 *Sample*

Individuals that work in growth-stage South African fintech which have received a minimum of series B funding were sampled for the study. Startups may seek different types of funding based multiple factors such as size of the business, growth trajectory and years in operation (to name a few). One of the types of funding startups may seek from potential investors is series B funding which is the third stage of startup funding (preceded by pre-seed and series A funding rounds). Investors participating in this round are often private equity or venture capitalist that are looking to provide capital in exchange for equity (Team, 2023). Series B funding is a fundraising round that startups may go through when the business has been operational for 1.5 to 2 years. In the series B round, investors are willing to invest anywhere from $10m to $20m depending on the industry

(*What Is Series B?*, n.d.). Companies often seek series B funding to expand their operations.

According to a report done by RMB (2018), investors are often looking for the following characteristics in a business during series B fundraising:

- Businesses that are still in the growth phase but are looking to scale by means of expanding their employees, product line or expand into new markets.
- An existing and growing client base
- A proven business model that is working, that is making revenue or even profitable.

Sampling individuals that work in fintech's that display these characteristics was important for the research as:

- Growth stage fintechs have more employees which provides access to a larger base of individuals that can participate in the study.
- Growth stage fintechs are iterating on their product offering which means they need to engage innovation and product development frameworks to achieve this.

3.4.3 *Sampling method*

The sampling method that was leveraged for the study was non-probability method sampling. Non-probability sampling method occurs when respondents are selected on a non-random basis (McCombes, 2022). Although non-probability sampling is cheaper and easier to access, it has limitations of a higher risk of bias. The reason non-probability was appropriate for the study because:

- It provided more certainty that respondents will be representative of the population as they could be handpicked and targeted.

- There is no database that has a list of individuals working in product teams in South African fintechs. These types of databases may be found in more regulated professions such as the institute of chartered accountants. In the absence of this database, the sampling method had to be based on referrals made through professional networks.

3.4.4 *Sample size*

For quantitative studies, it is advised that the higher number of data collected the better. The study achieved a sample size of 52 respondents. Kock and Hadaya (2016), propose using the 10 times rule (10 multiplied by the number of nodes in the framework) to come up with the ideal sample size to analyse data using PLS-SEM. For this study there are five nodes in the conceptual framework therefore the minimum requirement would have been 50. As the study yielded 52 responses (based on reasons already provided about population and sample size), the number met the threshold required by the 10 times rule to use PLS – SEM assess the results.

The sample size is further justified based on the following:

- Although there are over 1000 registered fintechs in South (Cloud, 2023), only several of these fintechs have publicly disclosed that they have received series B funding or may be considered in growth stage (it is important to note that startups are not obligated to disclose their funding rounds). According to a report by Disrupt Africa (2022), in 2022 of the 25 startups that disclosed, only one was on record to have received series B funding.
- Some of the fintechs that have disclosed that they received series B funding employ on average 150 people.
- Not all employees that work in a growth stage startup work within a product team and the study was limited to employees that work within the product development team.

There are limited quantitative studies on startups and fintech in South Africa to compare whether other studies have had similar challenges with sample size.

However, globally the startup market is better documented thus better access to data. An example of this is a study done Ghezzi (2018) was able to leverage a database of startups that had records from 2012 to collect their data.

3.5 The research instrument

The research instrument was a questionnaire consisting of closed-ended questions where the respondents could select their answer from pre-defined options. The questions could be answered using a five-point Likert scale.

The questionnaire started by explaining the objective of the research. Consent was requested from the respondent before starting the questionnaire.

Part A of the questionnaire asked the respondent a series of demographic questions. Part B of the questionnaire presented the respondent with a series of questions intended to understand the factors which influence the adoption of technology through the lens of an extended version of TAM (Table 2). The respondent had the ability to skip questions and stop the questionnaire at any point. The Likert scale in the questionnaire was flipped in some questions to encourage engaged responses. The respondent was advised once they have reached the end of the questionnaire and thanked for their participation.

Factors	**Hypothesis**	**Survey item**	**Source**
Perceived ease of use (PEU)	H1: Perceived ease of use has a positive effect on the attitude product teams have towards adopting the lean	PEU1: (18) I would find it easy to learn the principles of the lean startup principles PEU2: (19) Using the principles	(Kamal et al., 2020)

	startup methodology H2: Perceived ease of use has a positive effect on product teams' intention to adopt the lean startup methodology	from the lean startup methodology would be easy to understand for me PEU3: (20) It would make me feel good to use the lean startup principles if they are easy for me to integrate into my work	(Kamal et al., 2020) (Lee, 2009)
Perceived usefulness	H3: Perceived usefulness has a positive impact on the attitude that product teams have towards using the lean startup methodology H4: Perceived usefulness has a positive impact on the product team's intention to adopt the lean	PU1: (21) Using the principles from the lean startup would help me create better products PU2: (22) Using the principles from the lean startup would improve my product development process	(Kamal et al., 2020) (Kamal et al., 2020); (Lee, 2009)

	startup methodology		
Relative advantage	H5: Relative advantage has a positive impact on product team's perceived usefulness of the lean startup methodology	RA1: (23) Using the lean startup methodology would be better than the existing product development methodology I am using RA2: (24) Using the lean startup methodology would help me create more innovate products	(Al – Swidi et al., 2014) (Al – Swidi et al., 2014)
Influence of industry peers	H6: The influence of industry peers has an influence on the attitude that product teams have towards the lean startup methodology	IIP1: (25) I look at the frameworks/ processes that other organisations use to create innovative products IIP2: (26) The processes I use to create products are adapted from other organisations	(Al – Swidi et al., 2014) (Lee, 2009) (Al – Swidi et al., 2014) (Lee, 2009)

		IIP3: (27) I like to use frameworks/ processes that I have seen work for another organisation	(Al – Swidi et al., 2014) (Lee, 2009)
Attitude	H7: A positive attitude towards the lean startup methodology have a positive effect on the intention to use the methodology	A1: (28) How I feel about the lean startup methodology has an influence on whether I would use it in my product development process	(Lee, 2009) (Venkatesh et al., 2003)

Table 2: Hypotheses derived from literature.

3.6 Procedure for data collection

Data collection was achieved using a self-administered questionnaire. The questionnaire was designed using Qualtrics and the link to the questionnaire was shared with respondents using various messaging channels such as email, LinkedIn, WhatsApp, Teams, and Slack. Qualtrics was further used to collect, and securely store the data.

3.7 Data analysis strategies and interpretation

The data collected from the questionnaire was analysed using partial least square–structural equation modeling (PLS – SEM) conducted using R. Partial least square–structural equation modeling has been a more recently applied alternative to the more commonly used covariance structural equation modelling. According to Hair and Alamer (2022), PLS – SEM is most appropriate to use in studies where: complex models are analysed, the focus of the study is to assess prediction and when the data collected for the study does not meet the normal distribution assumptions. Considering a sample size of 52 respondents, a normality test was not conducted.

3.8 Quality Assurance

To ensure the quality and credibility of the research, the factors of validity and reliability were considered.

3.8.1 *Validity*

Validity is ensuring that the measurement tool (questionnaire) accurately measures what it was supposed to (Saunders et al, 2019). To safeguard validity for the study several considerations were made such as the careful selection of language (precise and avoids jargon) used in the questionnaire. The questions to measure each construct of the conceptual framework were adapted from prior literature. Although a large sample size would have been ideal to increase the validity of the study, to get accurate results (by ensuring responds met the criteria of the sample), purposive sampling was used. This had an impact of the external validity of the study. External validity is the extent to which the findings of the study may be generalised to other contexts (Calder et al, 1982). Therefore, the findings of this study may only scale if the exact criteria of sampling were met.

3.8.2 *Reliability*

Reliability measures whether the research questionnaire will produce consistent results under different circumstances. To ensure that respondents interpreted the questions the same way, as part of designing the survey, it was test with respondents that met a similar criterion to those that were to be sampled for the research. Another method that was used to ensure reliability was testing internal consistency using Cronbach's alpha and Dillion- Goldstein's rho. Cronbach's alpha is used to determine the reliability of the multi-variable measurement scales and is a standard test for reliability (Hair et al, 2013).

3.9 Ethical considerations

To conduct the study, ethical clearance was received through the university. To obtain this ethical clearance the study observed the principles of obtaining consent from respondents before they started the survey. Anonymity and confidentiality of respondents were also observed by not storing identifiable information when collecting the data and using Qualtrics (software) to securely store the data. Respondents were informed of these principles of consent, anonymity, and confidentiality in the cover letter of the survey.

CHAPTER 4. RESEARCH FINDINGS

This chapter presents the research findings of the study. It commences with data screening which addresses dealing with missing data and outliers. The profile of the survey respondents is reviewed, and the usage of lean startup principles is presented. The chapter concludes by using partial least square–structural equation modelling (PLS – SEM) to analyse the data linked to the research objectives.

4.1 Data screening

A total number of 187 individuals were identified and contacted to participate in the survey. The professional profiles of the individuals were reviewed to assess fit to the study's sample population. After ensuring that the individuals did indeed work in a product team in a South African fintech, they were contacted using various channels and were sent the survey link primarily via LinkedIn, email, and WhatsApp. A total of 58 people responded to the survey. The study, therefore, had a response rate of 31%. According to Gupta et al (2013), software engineering surveys do not receive high response rates therefore anything higher than 5% is considered acceptable in the field. Lethbridge et al. (2005) noted in their study that when individuals that work in software engineering are contacted by email to complete a web-based survey it consistently returns a low response rate of about 5%.

4.1.1 *Missing data*

To work with the most accurate data, the data were screened to identify responses that contained missing data. Of the 58 responses, 6 responses had missing data (not all the questions in the survey were completed) and these were excluded for analysis because the statistical software utilised - R, requires all the questions of the survey to be answered to compute the PLS-SEM model. Of the 6 excluded responses, only 1 respondent answered beyond section A of the survey. Overall, 52 responses were analysed.

4.2 Respondent demographics

50.00% of the respondents were over 35 (Table 3) and 58.62% of the respondents were women (Table 4).

Age	**%**	**Count**
Under 25	1.72%	1
25 - 30	13.79%	8
31 - 35	34.48%	20
Over 35	50.00%	29
Total	100%	58

Table 3: Respondent age

Gender	%	Count
Male	41.38%	24
Female	58.62%	34
Total	100%	58

Table 4: Respondent gender

4.3 Analysis and results

4.3.1 *Analysis of data of build – measure – learn feedback loop*

The foundation of the lean startup methodology is based on a build-measure-learn feedback loop. The data collected as part of the survey was intended to understand whether product teams in South African fintechs were already leveraging these principles as part of their product development process.

One of the principles of the lean startup methodology is to take an outside in approach to creating products, that is to start with understanding the customer's need first. 42% of respondents indicated that they were engaging in some form of customer research to and 47% of respondents said they relied on customer feedback to understand the needs of their customers. Therefore, product teams are using some form of data to develop a hypothesis as a baseline for developing products.

The second principle of lean startup is to test the hypothesis derived from understanding customer needs. 52.6% of respondents noted that they continuously evaluate their assumptions derived from customer research. 42% of respondents went further to test these assumptions by to guide their product development decisions. releasing a minimum viable product.

The third principle of lean startup is to measure. That is, to release a version of a product/ solution into the hands of a customer and measure the impact relative to the assumptions the product team had in place at the beginning. 41% of respondents somewhat agreed that they were tracking key metrics to understand how customers are using their products. 51% of respondents were using metrics

4.3.2 *PLS - SEM analysis*

PLS-SEM in R (version Rx64 4.12), utilising the plspm package, was applied in this study to test the conceptual framework shown in Table 8. PLS-SEM allows for an investigation and quantification of the relationship between latent constructs. According to Vinzi et al (2010) each Structural Equation Model is made up of two underlying models, a measurement model, and the structural model. The measurement model reviews the relationship between each factor (latent variable) and the corresponding indicator or manifest variables, which have been captured through each survey item. The structural model reviews the relationships between the factors.

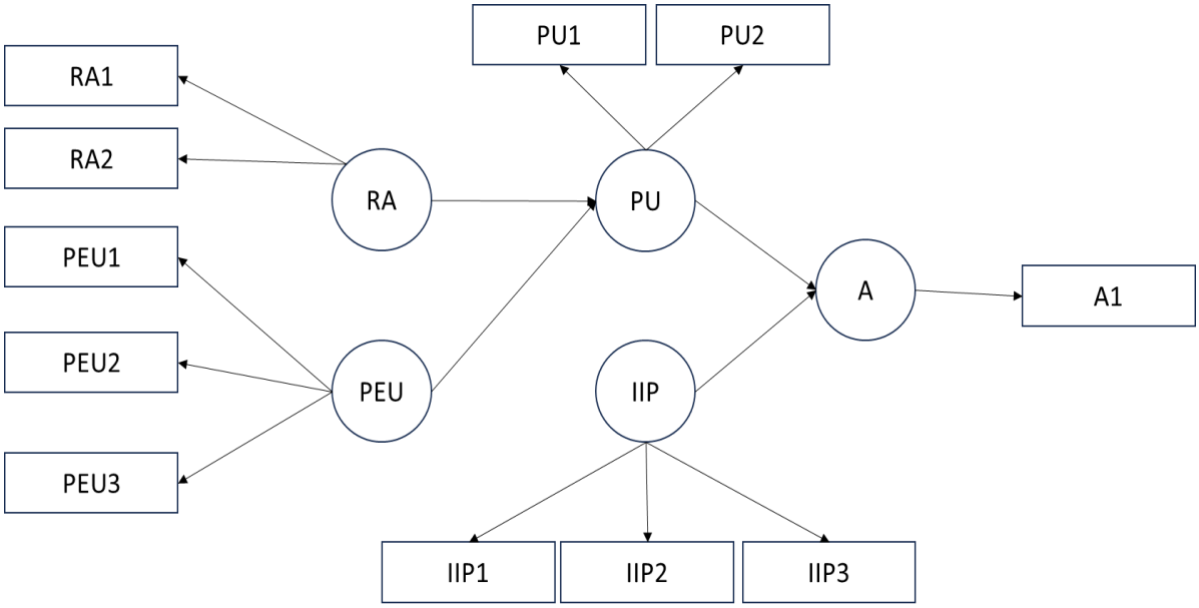


Figure 6: Conceptual framework analysed using PLS - SEM

The review of the PLS SEM model followed the model analysis in Sturm et al., 2022. Figure 1 is a demonstration the research model reviewed.

4.3.2.1 Measurement Model

Indicator reliability

The model used is a reflective model as the grouping or block of indicator variables related to each factor is assumed to measure a unique underlying hypothesis. The starting point of the analysis is a review of indicator reliability, which specifies how much of the variability of the indicators can be explained by the underlying factor. Vinzi et al (2010) reflect that a common test and threshold criterion is more than half of an indicator's variance is explained by the factor. This is showcased by loadings greater than or equal to 0.7. (Table 5).

Factor (Construct)	Indicator Variable	Weight	Loading
Perceived Ease of Use	PEU1	0.1009	0.374
	PEU2	0.0867	0.360
	PEU3	1.1197	0.993
Relative Advantage	RA1	0.7549	0.885
	RA2	0.8613	0.870
Perceived Usefulness	PU1	0.5850	0.899
	PU2	0.5979	0.873
Influence of Industry Peers	IIP1	0.6890	0.888
	IIP2	0.3655	0.586
	IIP2	0.1736	0.523
Attitude	A1	1.0668	1.0000

Table 5: Indicator reliability using indicator loadings.

Perceived Usefulness and Relative Advantage are the factors that have all their indicator variables reflecting adequate indicator reliability. Only one survey question was asked to assess Attitude thus the result will reflect perfect indicator reliability. A total of 4 of the 11 indicator variables showcase inadequate indicator reliability. These variables were deleted, and the PLS-SEM model was rerun however the results were largely like the original model and thus the analysis and review of the data have been done including all of the indicator variables.

Reliability is measured by Cronbach's alpha and Dillion-Goldstein's rho

Each block of indicator variables is assumed to measure the same distinctive underlying idea. We, therefore, test for internal consistency by performing two tests that assess the model's reliability or the extent to which each block measures the same idea. Cronbach's alpha is used to determine the reliability of the multi-variable measurement scales and is a standard test for reliability. According to Hair et al. (2013), Cronbach's alpha values of 0.60 to .070 are deemed to have a lower limit of acceptability.

Dillion-Goldstein's rho, which is also referred to as composite reliability is another measure commonly used measure reliability. It is also highlighted that whilst Cronbach's alpha assumes that each indicator variable is equally important in defining the factor, Dillion-Goldstein's does not make this assumption and thus an argument can be made that it represents a better measure of reliability (Vinzi et al 2010). As a rule of thumb, values above 0.70 in both measures indicate high reliability.

Table 6 shows the assessment of the model using the survey data. Perceived Usefulness and Relative Advantage are the two latent variables that showcase high reliability using both measures. It is noteworthy that using Dillion-Goldstein Rho all the latent variables have acceptable reliability. Attitude showcasing measurement values of 1 for both measures is merely highlighting that only one question was asked to assess Attitude toward the adoption of the lean startup approach.

	Indicator Variables	Cronbach's Alpha	Dillion-Goldstein's Rho
Perceived Ease of Use	3	0.605	0.792
Relative Advantage	2	0.703	0.871
Perceived Usefulness	2	0.727	0.880
Influence of Industry Peers	3	0.575	0.779
Attitude	1	1	1

Table 6: Reliability using Cronbach's alpha and Dillion- Goldstein's rho

The next step in the assessment of the Measurement Model is the evaluation of discriminant validity. Vinzi et al (2010) note that discriminant validity reflects the degree to which a given factor differs from the other latent variables. In their review utilising PLS-SEM discuss that an AVE figure above 0.5 reflects a factor with adequate discriminant validity (Vinzi et al 2010), Table 7 below reflects that Relative Advantage and Perceived Usefulness have adequate validity, whilst influence of industry Peers and Perceived Ease of Use do not.

Label	PEU	RA	PU	IIP	AVE
PEU					0.419
RA	0.3496				0.771
PU	0.223	0.4306			0.785
IIP	0.1171	0.0441	0.260		0.469
A	0.2193	0.0922	0.244	0.3831	1.000

Table 7: Factor correlations.

Structural Model

The second part of analysis using PLS – SEM is a review of the relationship between the factors. Table 8 captures the total relationship between all the combination of factors. An example is PEU relationship with Attitude is both direct and indirect (as it also has a relationship with PU). The relationships with a higher total have stronger relationship.

	Relationships	Direct	Indirect	Total
1	PEU -> RA	0.0000	0.0000	0.0000
2	PEU -> PU	0.0822	0.0000	0.0822
3	PEU -> IIP	0.0000	0.0000	0.0000
4	PEU -> A	0.1527	0.0102	0.1629
5	RA -> PU	0.4018	0.0000	0.4018
6	RA -> IIP	0.0000	0.0000	0.0000
7	RA -> A	0.0000	0.0497	0.0497
8	PU -> IIP	0.0000	0.0000	0.0000
9	PU -> A	0.1236	0.0000	0.1236
10	IIP -> A	0.3330	0.0000	0.3330

Table 8: Total effects for conceptual framework analysed using PLS - SEM

The p-value received from the PLS – SEM model is measured against this significance level. For this study, the significance level that has been selected to test the hypotheses is 5%.

From the regression data (Table 9 and Table 10) the following is observed:

H1 – PEU: The p-value is 0.55147 therefore the hypothesis is rejected. Perceived ease of use does not necessarily have a positive impact on the attitude to adopt lean startup.

H2 - PEU: The p-value is 0.258 therefore the hypothesis is rejected. Perceived ease of use does not necessarily have a positive effect on attitude of product teams.

H3 - PU: The p- value is 0.372 therefore the hypothesis is rejected. Perceived usefulness does not necessarily have a positive effect on the attitude of product teams

H5 - RA: The p – value is 0.00513, therefore the hypothesis is accepted. Relative advantage does have a positive effect on perceived usefulness

H6: The p – value is 0.017, therefore, the hypothesis is accepted. The influence of industry peers does influence the attitude that product teams have towards the lean startup methodology.

	Estimate	Std. Error	t value	Pr(>|t|)	Hypothesis Tested	Conclusion
Intercept	-1.01e-16	0.128	-7.82e-16	1.000		
PEU	0.0822	0.1337	0.600	0.55147	H1	Not supported
RA	0.402	0.137	2.93	0.00513	H5	Supported

Table 9: Regression model - perceived usefulness

	Estimate	Std. Error	t value	Pr(>|t|)	Hypothesis Tested	Conclusion
Intercept	-4.30e-17	0.129	-1.80e-15	1.000		
PEU	0.153	0.133	1.14	0.258	H2	Not Supported
PU	0.124	0.137	0.901	0.372	H3	Not Supported
IIP	0.333	0.135	2.47	0.017	H6	Supported

Table 10: Regression model – attitude

CHAPTER 5. Discussion of results

The objective of the study was to understand the factors influencing the adoption of lean startup principles product teams in South African Fintech. To understand this, the relationships between Perceived Usefulness, Perceived Ease of Use, Relative Advantage, Influence and Industry Peers and Attitude were examined.

From the hypothesis testing of the conceptual framework, two positive relationships were supported. Firstly, Relative Advantage was found to have a positive relationship with Perceived Usefulness (H5). Relative advantage indicates the perceived benefits and costs a user believes they will get from adopting a technology. This result is consistent with a supporting study by Hsbollah and Idris (2009), who found that relative advantage emerged as the most important factor that influences an organisation's willingness to adopt new technology. Additionally, diffusion scholars found relative advantage to be one of the best predictors of the rate of adoption of a new technology innovation (Al-Gahtani, 2003). Within the context of the study, given the fiercely competitive nature of the Fintech industry in South Africa, product teams are continuously seeking better ways to create products that will have product-market fit and ensure a competitive advantage. Therefore, if there is a framework (such as lean startup) that product teams deem will be beneficial by improving operational efficiency and product innovation they are more likely to think the framework is useful, thus adopting it.

The second hypothesis that was supported was the influence of industry peers. The results show that there is a positive relationship between Influence of Industry Peers and Attitude (H6). According to Ajzen (1985), subjective norm (influence of industry peers) is the perceived social pressure people feel from their social circle or peers on a decision to adopt a technology. This statement from Ajzen supports the findings of the study. The more perceived pressure product teams feel to remain relevant within the market (they operate in) and amongst their peers, the more likely they are to adopt new development frameworks and ways of work. An example of this is how organisations within the technology industry have adopted the goal setting frameworks - objectives and

key results (OKR's). As different organisations have observed the benefit that a highly respected technology giant such as Google (which is known as one of the first companies to adopt OKR's) has derived from the framework, this has influenced their attitude towards using OKRs internally as they anticipate deriving similar benefits to Google. The highly competitive nature of the Fintech industry means startups must continuously seek to stay abreast of trends and best practice to stay ahead of the competition and remain the product or service of choice for their existing and new customers. Therefore, when fintechs observe a positive trend within the industry such as their peers adopting a new way of work, there is likely to be a more positive attitude towards. The perceived pressure from the influence of industry peers can also come from the competition to attract top talent into the organisation. If there is a perception that the top talent is looking to work in organisations that continuously experiment and leverage test, measure, learn frameworks, the fintech is likely to have a more positive attitude towards adopting a culture of experimentation as a response to the pressure of attracting and retaining top talent.

From the study, three of the relationships were not necessarily supported H1, H2 and H3. The results show that there was not a positive relationship between Perceived Ease of Use and Attitude (H1). This result is not aligned to the empirical evidence from a study by Venkatesh and Davis (2000) which confirmed that there was a positive relationship between Perceived Ease of Use and Attitude as the user has less mental effort in learning the technology. This contradiction could be because Venkatesh and Davis (2000) were considering technology adoption in their study, whereas this research is focused on the adoption of a framework. Therefore, it could be that individuals do not anticipate learning a framework (such as lean startup) to be something as challenging as learning a new technology. A prior study by Riemenschneider et al (2002) that was focused on the adoption of software development methodologies (SDM) also found a lack of direct correlation between perceived ease of use and attitude towards adoption. The study attributes this to the possible difference in context between adoption of technology (IT) and a development methodology as some organisations may mandate methodologies on employees, thus reducing the relevance of how easy or hard the methodology is to perform

(Chan & Thong, 2009). This reasoning put forward by Chan & Thong (2009) could be the same reason there is also not necessarily a positive relationship between Perceived ease of use and intention to adopt (H2). If the adoption of a framework such as lean startup is made at an organisational level (as a top-down decision from management to encourage a culture of innovation within teams), the individuals working in the product teams may have to use it regardless of whether they think it is going to be easy to learn or not.

The final hypothesis that was not supported is H3, Perceived Usefulness does not necessarily have a positive relationship with Attitude (H3). These results are not consistent with those presented by previous literature. by Davis et al. (1989) useful a user perceives a technology to be, the more positive their attitude will be towards adopting it. A prior study by Hardgrave et al, 2003 which focused on the adoption of the agile methodology as a system development framework, found that the more it is perceived that the methodology will increase job performance, the more likely a user is to adopt it.

Overall, it is anticipated that prior literature would align to some of the findings of the research (H5 and H6) and not align with others (H1, H2 and H3). This is for several reason. In prior literature, the elements of the conceptual framework were mainly tested on a sample population in more technologically mature markets. Organisations in countries such as America are more mature in their adoption of product development frameworks such as lean startup, with some organisations in those markets pioneering the frameworks that have been adopted globally. Therefore, testing the conceptual framework in a developing market such as South Africa where technology development frameworks may not be as entrenched within organisations, was bound to yield varying results.

CHAPTER 6. Conclusion

In this final chapter, a summary of the research findings is presented. A discussion is presented on whether the research objective has been met. The chapter continues to discuss the limitations of the study and then concludes by suggesting future research opportunities.

6.1 Summary of findings

The objective of the study was to understand the factors influencing the adoption of lean startup principles by product teams in South African fintechs.

The first aim was to understand how product teams were already integrating the lean startup principles of build–measure–learn into their product development process. The findings were that product teams were (in some capacity) researching their customer's needs and using those findings to guide what products and solutions to build. Product teams were also testing their assumptions using minimum viable products and using metrics to track product performance.

The second aim was to determine the factors influencing adoption using an extended version of TAM. The conceptual framework was tested using PLS-SEM. From the results, the following hypothesis were accepted - Relative advantage has a positive relationship with Usefulness and Influence of Industry Peers has a positive relationship with Attitude. Three of the hypotheses were rejected as they could not be supported, those were Perceived ease of Use did had a positive relationship with Perceived Usefulness; Perceived Ease of Use had a positive relationship with attitude and Perceived Usefulness had a positive relationship with attitude.

6.2 Limitations of the study

Although the research has shed some light on factors influencing the adoption of lean startup, it must be noted that the study had several limitations.

Firstly, the sample size of the study was limited to 52 responses. The limited sample size was influenced by a limited population of the number of fintechs that have disclosed that they received series B funding.

Secondly, there could be sampling bias from the use of purposive sampling which may occur due to respondents of the research having been selected through referrals from professional networks and recommendations.

Thirdly, due to sampling techniques, the study has limited external validity, therefore, may not be as easily generalised.

Fourth, as the data was collected using a self-administered survey, there is a possibility that some respondents answered the questions based on their own understanding (leaving no possibility for them to clarify a misunderstanding) instead of what the question was intended to ask.

6.3 Recommendations for future research

Recommendations for future research

The results of this study provide new opportunities for future research. First, researchers could build on the study by expanding the research to other African markets with a growing fintech market. The fintech market is expected to grow in the following 11 markets: Cameroon, Cote d'Ivoire, Egypt, Ghana, Kenya, Morocco, Nigeria, Senegal, South Africa, Tanzania, and Uganda (Fintech in Africa: The End of the Beginning, 2022). Doing this would address not only address the limitation of the sample but could also further enhance the body of knowledge available on fintechs in Africa. Second, through literature it is apparent that lean startup may be applied across multiple industries (not just technology) and to any size organisation (not just startup). Future researchers could expand the research to enterprises and to other industries such as healthcare.

For this research, a deliberate decision was taken to use PLS-SEM to test the hypothesis. Future researchers may test the same hypothesis using SEM.

Recommendations for South African fintechs

The South African fintech industry will continue to experience growth. With increased investment into the sector and several untapped opportunities, the sector will experience new entrants and increased competition to become and remain profitable. The research proposes that South African fintechs seek to leverage frameworks such as lean startup to create significant products that have an impact on the lives of customers. Product teams should lean on proven practices of continuously validating their hypothesis by frequently releasing MVPs to their customers and measuring the impact the solution has. This will help them to avoid investing time and money in ideas that customers are unlikely to succeed as customers will not adopt. The principles of lean startup should become embedded in the ways of work of South African Fintechs for sustainable business growth.

6.4 Conclusion

This study has contributed to the literature on Fintech in South Africa. Although it is a relatively new industry that has garnered a lot of interest and investment (due to how quickly it is growing) there is not a lot of research that has been contributed towards understanding and documenting the ecosystem. This study has made a good attempt in starting to address that literature gap.

When considering research about adoption and adoption frameworks, these have been based on the adoption of technology. This research has contributed to considering a different dimension of technology adoption, which is the adoption of frameworks that technology teams use.

Through the development and testing of a conceptual framework (expanded TAM), the study has proven that for product teams in South African fintechs, Relative advantage positively impacts Usefulness, and the Influence of Industry

Peers positively impacts Attitude. As a result of testing of the model, it is now known that this factor supports the adoption of lean startup.

This study will serve as a building block for future research on the fintech industry in South Africa.

REFERENCES

Accenture (2022, February 26). *Tuning into Africa's digital transformation*. https://www.accenture.com/us-en/insights/software-platforms/africa-digital-transformation

Acharya, S., & Mekker, M. M. (2022b). Public acceptance of connected vehicles: An extension of the technology acceptance model. Transportation Research Part F-traffic Psychology and Behaviour, 88, 54–68. https://doi.org/10.1016/j.trf.2022.05.002

African private equity and venture capital associate (2022, April). *Venture capital in Africa report.* https://www.avca-africa.org/media/2967/62644-avca-avca-venture-capital-in-africa-report-v13.pdf

Aha (n.a.). *How to structure your product development team*. https://www.aha.io/roadmapping/guide/product-management/what-makes-up-the-product-team

Ajzen, I. (1991). The theory of planned behavior. *Organizational Behavior and Human Decision Processes, 50*(2), 179–211. https://doi.org/10.1016/0749-5978(91)90020-t

Akgun, A.E., & Keskin, H. (2021). Team intuition and creativity in new product development projects: A multi-faceted perspective. *Journal of Engineering and Technology Management, 62,* 101660. https://doi.org/10.1016/j.jengtecman.2021.101660

Al-Gahtani, S. S. (2003). Computer technology adoption in Saudi Arabia: Correlates of perceived innovation attributes. Information Technology for Development, 10(1), 57–69. https://doi.org/10.1002/itdj.1590100106

Al-Swidi, A. K., Huque, S. M. R., Hafeez, M., & Shariff, M. N. M. (2014). The role of subjective norms in theory of planned behavior in the context of organic

food consumption. British Food Journal, 116(10), 1561–1580. https://doi.org/10.1108/bfj-05-2013-0105

Awa, H.O., Ojiabo, O.U. & Emecheta, B.C. (2015). Integrating TAM, TPB and TOE frameworks and expanding their characteristic constructs for e-commerce adoption by SME's. Journal of Science and Technology Policy Management 6(1), 76-94. 10.1108/JSTPM-04-2014-0012

Bai, W., Feng, Y., Yue, Y., & Feng, L. (2017). Organizational Structure, Cross-functional Integration and Performance of New Product Development Team. *Procedia Engineering, 174*, 621 – 629. https://doi.org/10.1016/j.proeng.2017.01.198

Bajwa, S.S., Wang, X., Nguyen Duc, A., & Abrahamsson, P. (2017). "Failures" to be celebrated: an analysis of major pivots of software startups. *Empirical Software Engineering, 22*(5), 2373–2408. https://doi.org/10.1007/s10664-016-9458-0

Blank, S. (2013, May). *Why the lean startup changes everything*. Harvard Business Review. https://hbr.org/2013/05/why-the-lean-startup-changes-everything.

Benbasat, I., & Barki, H. (2007). Quo vadis TAM? Journal of the Association for Information Systems, 8(4), 211–218. https://doi.org/10.17705/1jais.00126

Braun V., & Clarke, V. (2006). Using thematic analysis in psychology. *Qualitative Research in Psychology, 3*(2), 77–101. http://dx.doi.org/10.1191/1478088706qp063oa

Calder, B. J., Phillips, L. W., & Tybout, A. M. (1982). The Concept of External Validity. Journal of Consumer Research, 9(3), 240. https://doi.org/10.1086/208920

Chan, F. K. Y., & Thong, J. Y. (2009). Acceptance of agile methodologies: A critical review and conceptual framework. Decision Support Systems, 46(4), 803–814. https://doi.org/10.1016/j.dss.2008.11.009

Cloud, H. (2023, May 12). SA fintechs likely to converge into 'super app.' ITWeb. https://www.itweb.co.za/content/Pero3MZ3PV4qQb6m

Coetzee, J. (2018). Strategic implications of Fintech on South African retail banks. *South African Journal of Economic and Management Sciences 21*(1). https://doi.org/10.4102/sajems.v21i1.2455

Davis, F. D. (1989). Perceived Usefulness, Perceived Ease of Use, and User Acceptance of Information Technology. Management Information Systems Quarterly, 13(3), 319. https://doi.org/10.2307/249008

Dempsey. B. (2018, Jan 11). *Business life cycle spectrum: where are you?.* Forbes. https://www.forbes.com/sites/theyec/2018/01/11/business-life-cycle-spectrum-where-are-you/?sh=277c7abef5e8

De Faria, V. F., Santos, V. C., & Zaidan, F.H. (2021). The Business Model Innovation and Lean Startup Process Supporting Startup Sustainability. *Procedia Computer Science,181*, 93-101, https://doi.org/10.1016/j.procs.2021.01.106

Disrupting Africa (2022). The African Tech Startups Funding Report. https://disrupt-africa.com/wp-content/uploads/2023/02/The-African-Tech-Startups-Funding-Report-2022.pdf

Fintech in Africa: The end of the beginning. (2022, August 30). McKinsey & Company. https://www.mckinsey.com/industries/financial-services/our-insights/fintech-in-africa-the-end-of-the-beginning

Fishbein, M., & Ajzen, I. (1975). *Belief, Attitude, Intention and Behavior: An Introduction to Theory and Research*. Reading, MA: Addison-Wesley

Gallo, A. (2017, June 28). "A Refresher on A/B Testing." https://hbr.org/2017/06/a-refresher-on-ab-testing

Glavee-Geo, R., Shaikh, A. A., & Karjaluoto, H. (2017). Mobile banking services adoption in Pakistan: are there gender differences? International Journal of Bank Marketing, 35(7), 1090–1114. https://doi.org/10.1108/ijbm-09-2015-0142

Hair, J. F., & Alamer, A. (2022). Partial Least Squares Structural Equation Modeling (PLS-SEM) in second language and education research: Guidelines using an applied example. Research Methods in Applied Linguistics, 1(3), 100027. https://doi.org/10.1016/j.rmal.2022.100027

Hardgrave, B., Davis, F.D., & Riemenschneider, C. (2003). Investigating determinants of software developers' intentions to follow methodologies, Journal of Management Information Systems 20 (1) 123–151.

Holden, R. J., & Karsh, B. (2010). The Technology Acceptance Model: Its past and its future in health care. Journal of Biomedical Informatics, 43(1), 159-172. https://doi.org/10.1016/j.jbi.2009.07.002.

Hsbollah, H. M., & Idris, K. M. (2009). E-learning adoption: the role of relative advantages, trialability and academic specialisation. Campus-wide Information Systems, 26(1), 54–70. https://doi.org/10.1108/10650740910921564

Htun, A., Khaing, C., & Maw, T. (2019). Lean Manufacturing, Just in Time and Kanban: Case Study of Toyota Production System (TPS). *International journal of scientific engineering and technology research, 8*, 498-502

Joseph L. Bower & Clayton M. Christensen (1995). *Disruptive technologies: catching the wave.* Harvard business review. https://hbr.org/1995/01/disruptive-technologies-catching-the-wave

Kamal, S. A., Shafiq, M., & Kakria, P. (2020). Investigating acceptance of telemedicine services through an extended technology acceptance model (TAM). Technology in Society, 60, 101212. https://doi.org/10.1016/j.techsoc.2019.101212

Kene-Okafor, T. (2021, December 30). *African tech took center stage in 2021*. Tech Crunch. https://techcrunch.com/2021/12/30/african-tech-took-center-stage-in-2021/

KPMG. (n.a). *Fintech investment pours into Africa*. https://home.kpmg/xx/en/home/insights/2022/01/pulse-of-fintech-h2-2021-emerging-markets-africa.html

Lee, M. C. (2009). Factors influencing the adoption of internet banking: An integration of TAM and TPB with perceived risk and perceived benefit. *Electronic commerce research and applications, 8*(3), 130-141.

Lethbridge, T. C., Sim, S. E., & Singer, J. (2005). Studying Software Engineers: Data Collection Techniques for Software Field Studies. Empirical Software Engineering, 10(3), 311–341. https://doi.org/10.1007/s10664-005-1290-x

LinkedIn Login, Sign in | LinkedIn. (n.d.). LinkedIn. https://www.linkedin.com/company/ozowsecurepayments/about/

McGrath, R. G., & MacMillan, I. C. (1995). *Discovery driven planning*. Harvard Business Review. https://hbr.org/1995/07/discovery-driven-planning

Mollick, J., Cutshall, R., Changchit, C., & Pham, L. (2023). Contemporary mobile commerce: determinants of its adoption. *Journal of theoretical and applied electronic commerce research, 18*(1), 501 – 523. https://doi.org/10.3390/jtaer18010026

Münch, J., Fagerholm, F., Johnson, P., Pirttilahti, J., Torkkel, J., & Jäarvinen, J. (2013). Creating Minimum Viable Products in Industry-Academia Collaborations. Springer eBooks, 137–151. https://doi.org/10.1007/978-3-642-44930-7_9

Naked Insurance. (n.d.). *Insurance changes for good: Naked raises R160 million (US$11m) in funding*. https://www.naked.insure/blog/insurenaked/insurance-changes-for-good-naked-raises-r160-million-us-11m-in-funding

Pantiuchina, J., Mondini, M., Khanna, D., Wang, X., & Abrahamsson, P. (2017). Are Software Startups Applying Agile Practices? *Agile Processes in Software Engineering and Extreme Programming, Springer, 283*, 167-183. https://doi.org/10.1007/978-3-319-57633-6_11

Puschmann, T. (2017). Fintech. *Bus Inf Syst Eng, 59*(1), 69–76. DOI 10.1007/s12599-017-0464-6

Riemenschneider, C.K., Hardgrave, B.C., & Davis, F.D (2002). Explaining software developer acceptance of methodologies: a comparison of five theoretical models, IEEE Transactions on Software Engineering 28 (12) 1135–1145.

Ries, E. (2011). *The lean startup: How today's entrepreneurs use continuous innovation to create radically successful businesses*. Crown Books.

Ries, E. (2017). *The startup way: making entrepreneurship a fundamental discipline of every enterprise*. Crown Business, New York.

Rogers, E. (2002). Diffusion of preventive innovations. *Addictive Behaviors*, 27, 989 – 993. http://www.sietmanagement.fr/wp-content/uploads/2017/05/Rogers2002.pdf

Saunders, M.N.K., Lewis, P., & Thornhill, A. (2019). *Research Methods For Business Students-Pearson Education* (8th ed.). Pearson.

Sherperd, D. A., & Gruber, M. (2021). The Lean Startup Framework: Closing the Academic–Practitioner Divide. Entrepreneurship Theory and Practice, 45(5), 967–998. https://doi.org/10.1177/1042258719899415

Stephens, B. S., Butler, J. M., Garg, R. K., & Gibson, D. I. (2019). Austin, Boston, Silicon Valley, and New York: Case studies in the location choices of entrepreneurs in maintaining the Technopolis. *Technological Forecasting and Social Change, 146,* 267-280. https://doi.org/10.1016/j.techfore.2019.05.030

Team, C. (2023, October 18). Series B financing. Corporate Finance Institute. https://corporatefinanceinstitute.com/resources/career-map/sell-side/capital-markets/series-b-financing/

Venkatesh, V., & Davis, F. D. (2000). A Theoretical Extension of the Technology Acceptance Model: Four Longitudinal Field Studies. Management Science, 46(2), 186–204. https://doi.org/10.1287/mnsc.46.2.186.11926

Venkatesh, V., Morris, M. A., Davis. G. B., & Davis, F. D. (2003). User Acceptance of Information Technology: Toward a Unified View. Management Information Systems Quarterly, 27(3), 425. https://doi.org/10.2307/30036540

Vinzi, V. E., Chin, W. W., Henseler, J., & Wang, H. (2010). Handbook of Partial Least Squares. In Springer eBooks. https://doi.org/10.1007/978-3-540-32827-8

Wang, L. L. (2010). Quantitative Research Methodology: Common Pitfalls and Recommended Solutions. *Newborn and Infant Nursing Reviews*. https://doi.org/10.1053/j.nainr.2009.12.002

Waris, I., Ali, R., Nayyar, A., Baz, M., Liu, R., & Hameed, I. (2022). An Empirical Evaluation of Customers' Adoption of Drone Food Delivery Services: An Extended Technology Acceptance Model. *Sustainability*, *14*(5), 1-18. https://doi.org/10.3390/su14052922

What is Series B? (n.d.). https://www.cbinsights.com/research-what-is-series-b/

York, J. L., & Danes, J. E. (2014). Customer Development, Innovation, and Decision-Making Biases int he Lean Startup. Journal of Small Business Strategy, 24(2), 21–40. http://libjournals.mtsu.edu/index.php/jsbs/article/download/191/177

Zalan., T & Toufaily, E. (2017). The Promise of Fintech in Emerging Markets: Not as Disruptive