The role of post hackathon activities on project continuation in a telecommunications organisation

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

Johannesburg, 2022

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ABSTRACT

The purpose of the study was to examine the role of post hackathon activities on project continuation in a telecommunications organisation. The research objectives:

- Evaluated the participants' motivation and intended outcomes for participating in hackathon events and linkage to project continuation, and
- Identified the participants' post hackathon activities and the role the post hackathon activities have on project continuation.

The study was conducted as a case study and was focussed on the employees who participated in hackathon events held between the years 2018 and 2020 within a telecommunications organisation. Semi-structured virtual interviews were held with hackathon participants across a number of African countries where the organisation has presence (South Africa, Lesotho, Democratic Republic of Congo, Tanzania, Mozambique, Kenya and Ghana).

The study found participants that were rewarded were motivated to pursue project continuation and further found no link between continuation intentions and continuation behaviour. Moreover, the activity of securing financial commitment and sponsorship prior to the hackathon event was found to be beneficial for the purpose of project continuation and lessened the burden on the participants to seek project funding. Teams who developed functional prototypes adding value to existing products pursued project continuation and the absence of management commitment regarding project prioritisation negatively impacted on project continuation.

KEYWORDS

Hackathon, Project continuation, Continuation intentions, Continuation behaviour, Project integration

DECLARATION

I, **Zanele Ratsoga**, declare that this research report is my own work except where indicated in the references and acknowledgements. It is submitted in partial fulfilment of the requirements for the degree of Master of Management in the field of Digital Business at the University of Witwatersrand, Johannesburg. It has not been submitted before for any degree or examination at this or any other university.

Name**: Zanele Ratsoga** Signature: 

Signed at: **Pretoria**

On the **7th** day of **July** 2022

DEDICATION

This paper is dedicated to my late mother, Kedibone Salome Phatedi whose love became the pillar of strength which kept me going even through the difficult time of her passing. It is also dedicated to my two late friends Simphiwe Zwane and Keneilwe Mogasoa whose friendship, love and belief in me remain my most treasured memories.

I dedicate and give gratitude to my husband: Sekai, my children: Kaone and Resego; and my siblings: Dikeledi, Ntsatsi and Moerane for their endless love and unwavering support during the entire Master's program.

ACKNOWLEDGEMENTS

I would firstly love to thank God who helped me to complete this master's program amidst a challenging season in my life. I know without Him; this would not have been possible.

I would also like to express gratitude to the following:

- My supervisor, Professor M Raborife for the unwavering support and guidance until the end.
- Dr EM Faku, for the support and the willingness to always lend an ear.
- My employer and colleagues who provided me with the research data, time and support needed to ensure this degree could be completed.
- My family and friends who had to keep up with long periods of my absence yet remaining supportive.

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

LIST OF ACRONYMS

CRO	Chief Risk Officer
DRC	Democratic Republic of Congo
EXCO	Executive leadership of an organisation
ME	Management Executive

CHAPTER 1. INTRODUCTION

1.1 Purpose of the study

This study investigated the role of post hackathon activities on project continuation within hackathon events hosted by corporates. We firstly evaluated the participants' motivation and intended outcomes for participating in hackathon events and the linkage to project continuation. Secondly, we identified the post hackathon activities and the role of the post hackathon activities on project continuation. The research was conducted as a case study on an organisation in the telecommunications industry with a presence in a number of African countries (South Africa, Lesotho, Democratic Republic of Congo, Tanzania, Mozambique, Kenya and Ghana) which hosted hackathons as a means to drive innovation.

1.2 Context of the study

Organisations operate in competitive environments and constantly remain under pressure to provide innovative solutions to retain and attract customers. Innovation is defined as the application of new technology and market information to create a new product or service that people will desire, requiring knowledge that has never been previously utilized to create the product or service in question (Afuah, 2020; Drucker, 2002). The majority of innovations inside a firm or industry are the product of a deliberate, purposeful search for new ideas, which can be discovered through unexpected events, inconsistencies, process demands, and industry and market developments (Drucker, 2002; Mielikäinen et al., 2018). Hackathons have become one of the strategies organisations use to speedily develop prototypes which can turn into solutions providing value to customers (Herbsleb et al., 2018; Lifshitz-Assaf et al., 2021; Rosell et al., 2014).

The most significant adoption of hackathons started in the mid to late 2000s as competitive events which focussed on driving product innovation with higher prevalence at large technology companies and university computing environments (Herbsleb et al., 2018). Hackathons are time-limited, problem-

oriented, computer programming events showcasing prototypes of digital innovation, where people meet and form teams (Lifshitz-Assaf et al., 2021). Each team tries to complete their chosen project of interest, usually within two to five days (Briscoe & Mulligan, 2014; Herbsleb et al., 2018). The motive for hosting hackathons is to generate innovative ideas through technology; however, companies also view them as teambuilding or recruiting events (Kohne & Wehmeier, 2020).

Company X, a telecommunications organisation, was established in South Africa in the early 1990's. The organisation has since extended its footprint to a number of African countries including Lesotho, Democratic Republic of Congo, Tanzania, Mozambique, Kenya and Ghana. According to its latest annual report it states that it's an African organisation focused on providing a wide range of communication services including data, mobile and fixed voice, messaging, financial services, enterprise IT and converged services to over 100 million customers.

The organisation reported a group revenue of over just over R100bn for the current financial year and has over 12,000 employees. It further reports that it is currently holds the most market share across the markets it operates in within the African continent. It is currently on pursuit to transition from a traditional telecommunications company to a fully-fledged digital technology company aiming to provide superior growth and returns to shareholders, differentiation from competitors by taking advantage of its geographic expansion and product diversification while incorporating Big Data analytics, machine learning (ML) and world-class technology .

The organisation started to host hackathons in 2018. Its intention was to create networking opportunities and build up communities of developers who would come together over two days to develop a prototype. During the event, participants grouped themselves into teams, developed the prototypes, present the ideas to a panel of judges, and thereafter the top five winning teams were announced. However only the top 5 teams would be awarded prize monies; the first team would be awarded an equivalent of R250 000, the second team R150 000, the third team received R 50 000, with each member of the fourth and

fifth teams receiving R2 500 and R1 500 vouchers respectively. Initially the winning team was chosen purely on the basis of the best innovative idea, however over time the winning team became the one which provided an innovative idea which met a business need. The organisation reports that over the three years, from a pool of about 80 hackathon ideas, less than 15% of projects were ultimately implemented, which raised a concern to the organisers and sponsors who were hoping for a much higher percentage.

The ultimate expectation with any innovation is a launched product meeting a customer need (Alkema et al., 2017). In the economic sense, only the first commercial transaction incorporating the new product or process system qualifies as an innovation (Afuah, 2020). However, there has been minimal success regarding projects being continued within target Company X. This finding concurs with the work of Cobham et al. (2017) and McIntosh and Hardin (2021), who assessed hackathon outcomes as low. Even if the event can be assessed to be successful, results are seldom economically exploited (Komssi et al., 2015; Nolte et al., 2018). Hackathon outcomes remain a contested space with criticism regarding whether organisations receive a return on the finances and time invested (Kohne & Wehmeier, 2020; Medina Angarita & Nolte, 2020; Nolte et al., 2020).

1.3 Research problem

There are substantial resources invested into hosting hackathon events both monetary and non-monetary. Organisers provide food, monetary and non-monetary rewards, convenient facilities, adequate internet connections and the availability of potential sponsors or investors (Soltani et al., 2014). However, whether corporates attain a return on investment on hackathon events has been questioned due to the low rate of post-hackathon project continuation (Kohne & Wehmeier, 2020; Medina Angarita & Nolte, 2020; Nolte et al., 2020). Thus, the return on investments would be better realised if there were post hackathon activities conducted to encourage project continuation.

These activities need to be identified and means devised as to how they can be supported. Most of the research studies have focused on the event preparation and operational activities occurring within it (Briscoe & Mulligan, 2014; Falk et al., 2021; Komssi et al., 2015; Soltani et al., 2014; Stoltzfus et al., 2017; Tang & Vezzani, 2017). However, fewer studies have focused on project continuation, specifically delivering more sustained outcomes (Medina Angarita & Nolte, 2020; Nolte et al., 2020; Nolte et al., 2018).

In this regard, project teams who initially set intentions of project continuation were found to have more success (Nolte et al., 2018). Therefore, in order to realise success after a hackathon event, a determination should first be made about the participants' motivations and intended outcomes for participating in the event. It should be ascertained whether these intentions resulted in behaviour leading to project continuation. Further to this, team size, team familiarity, prior hackathon participation, skill matching, skill diversity, preparation activities, project complexity and winning the hackathon are elements found to likely to positively influence project continuation (Nolte et al., 2020). The post hackathon activities the participants engage in and the role those have on project continuation need to be determined. This research study therefore evaluated participants' motivations and intended outcomes for participating in hackathon events. It identified post hackathon activities conducted by hackathon participants to pursue project continuation.

1.4 Research objectives

The research objectives identified aimed to:

[1] Evaluate the participants' motivation and intended outcomes for participating in hackathon events and linkage to project continuation.

[2] Identify the participants' post hackathon activities and the role the post hackathon activities have on project continuation.

1.5 Research questions

The research questions are:

[1] How are the participants' motivation and intended outcomes for participating in hackathon events linked to project continuation?

[2] What are the participants' post hackathon activities and what role does the post hackathon activities have on project continuation?

1.6 Significance of the study

According to Kohne and Wehmeier (2020), one of the identified goals for hosting hackathons is to drive innovation, where participants are expected to develop new ideas or prototypes in the shortest possible time. Innovation does not end with ideation, but the expectation is that ideas from hackathon events should continue until implementation (Happonen et al., 2020; Steglich et al., 2020).

As a study, the focus was directed towards evaluating the role of post hackathon activities on project continuation. The study findings were expected to assist the hackathon organisers with insights regarding the post hackathon activities participants engage in and the role of those activities in project continuation. This information could empower hackathon organisers with knowledge of the circumstances and environment to be created for project continuation. It would ensure that innovative ideas emanating from hackathon events could be converted into scalable ideas. Firstly, the study added more knowledge about whether continuation intentions could be linked to continuation behaviour in a corporate setting. Secondly, it provided an indication of the post hackathon activities different teams engaged in and the role of post hackathon activities on project continuation.

1.7 Delimitations of the study

The study focused on hackathons hosted by corporates in the African continent with the intention to drive internal innovation. It included internal hackathons

hosted by corporates irrespective of industry, but excluded hackathons hosted by educational or community institutions.

Hackathons have multiple role players – the organisers, the participants, judges, mentors, investors etc. which influence project continuation intentions. However, this study solely focussed on the participants of the hackathons as the central actors for the product/venture development during the hackathon and post-hackathon phases.

The study distinguished between project continuation in terms of product or venture development and expanding the user base of a project or adding new features as these intentions have different continuation behaviour (Nolte et al. 2020). This study rather focused on project continuation in terms of product or venture development for commercial means.

1.8 Definition of terms

The term "hackathon" originates from a combination of two words, "hack" and "marathon", meaning the positive sharing of knowledge and development of a prototype in a time-constrained and pressurised environment (Kohne & Wehmeier, 2020; Komssi et al., 2015; Pe Than et al., 2020; Raatikainen et al., 2013; Soltani et al., 2014).

Literature has provided a few definitions for hackathons with slightly different meanings. For instance, Raatikainen et al. (2013) define hackathons as events during which team members participate in intensive prototyping activities within a limited time. Topi and Tucker (2014) define them as events where developers use existing software resources to build useable outputs in a time-boxed timeframe. Herbsleb et al. (2018) furthermore, defined hackathons as time-limited events, usually over two to five days, where individuals come together to complete projects of interest. Lastly, Kitsios and Kamariotou (2019b) defined hackathons as occasions where people from various fields collaborate to create applications offering mutually beneficial arrangements to all stakeholders.

For this study, the hackathon definition was adapted to be: *highly intensive events where individuals from various fields form groups and collaborate to develop prototypes*.

Additional terms are presented in Table 1-1 below:

Table 1-1: Definition of terms

Term	Definition
Business	The business department that a hackathon idea impacts or belongs to.
Hackathon	Highly intensive events where individuals from various fields form groups and collaborate to develop prototypes.
Program increment schedules	A schedule that contains projects to be deployed, per quarter into the organisation's systems
Workplace	An online collaboration tool used by organisations. It is provided by Meta with features such as instant messaging and news sharing

1.9 Assumptions

The following assumptions applied for this research study:

[1] Participants shared their honest perspectives and experiences from taking part in hackathon events.

[2] Corporates that host hackathons expect project continuation as a by-product as innovations and/or prototypes are scaled and brought to market.

1.10 Chapter outline

The outline of the research document will be as follows:

Chapter 2 gives a detailed overview of the relevant literature, assesses the identified variables and concludes with the study's analytical framework.

Chapter 3 provides the research methodology approach used. It addresses the research approach and design, research instrument, population, and sampling. It further unpacks methods and procedures for data collection and analysis, study limitations; instrument validity and reliability; and ethical considerations.

Chapter 4 presents the findings of the research; Chapter 5 discusses the research findings and Chapter 6 provides the conclusions pertaining to the research objectives and finally provides suggestions for future research.

CHAPTER 2. LITERATURE REVIEW

2.1 Introduction

Chapter 2 focusses on the hackathon phenomenon, corporate hackathons, as well as project continuation themes. It positions this study within the context of other studies. The chapter will conclude by stating the study propositions and analytical frameworks.

2.2 The Hackathon phenomenon

The word ‘hackathon’ is made up of two words ‘hack’ and ‘marathon’ – after the 42km marathon. It is just like in a marathon where effort is focussed; but in this case, the focus is developing software to bring about a solution (Kohne & Wehmeier, 2020; Komssi et al., 2015). It further means the positive sharing of knowledge and the development of a prototype in a time-constrained and pressurised environment (Kohne & Wehmeier, 2020; Komssi et al., 2015; Pe Than et al., 2020; Raatikainen et al., 2013; Soltani et al., 2014). While hacking is normally associated with negativity and cybercrimes, in a hackathon setting it refers to an experimental programming event (Flus & Hurst, 2021).

Hackathons gained prominence in the mid-2000s as a mechanism to merge technology and problem-solving in a competitive setting (Herbsleb et al., 2018; Medina Angarita & Nolte, 2021). Hackathons as a form of innovation can be conducted in either corporate, civil, or educational settings respectively (Komssi et al., 2015; Leclair, 2015; Kienzler, 2016). Medina Angarita and Nolte (2020) categorised hackathon typology as either community nurturing, contributive or issue-oriented, or catalytic – innovation searching.

In their quantitative study considering project continuation across the different types of hackathons, Nolte et al. (2020) reported that only one-third of all hackathons occur in the corporate space. It is therefore anticipated that this study will add to the body of knowledge regarding hackathons in a corporate environment.

2.2.1 *Corporate Hackathons*

Companies in this competitive age have been forced to seek innovative ways to decrease product development cycles (Herbsleb et al., 2018; Poncette et al., 2020). Hackathons were therefore designed to deliver innovation, new products and new ventures, and corporates set aside considerable budgets to fund these initiatives as sources of competitiveness (Kitsios & Kamariotou, 2019a). Through hackathons, ideas can be generated, and revenue making prototypes developed which answer fundamental problems facing organisations (Komssi et al., 2015).

The systematic literature review by Medina Angarita and Nolte (2020) of 29 peer-reviewed journal papers and 62 peer-reviewed conference papers further contextualised two types of tangible outcomes and five types of intangible outcomes listed with examples below.

- Tangible outcomes of hackathons (Medina Angarita & Nolte, 2020)
    - Technical artefacts (e.g., new prototypes, product features, bug fixes) and
    - Non-technical artefacts (e.g., visualisations, new or improved documentation, publications).
- Intangible outcomes of hackathons (Medina Angarita & Nolte, 2020)
    - Learning (e.g., about a hackathon, new technology, new industry),
    - Networking (e.g., meeting new people, more opportunities to collaborate),
    - Interdisciplinary collaboration (e.g., creative ideation),
    - Entrepreneurship or fostering existing enterprise, and
    - Fostering awareness about hackathon theme.

It is a fact that organisations struggle to come up with innovative ideas; however, the real challenge is in implementing those ideas. Hjalmarsson et al. (2014) identified several hindrances which prevent ideas from being implemented. These included lack of partner cooperation for technical development, lack of partner cooperation for knowledge transfer, inappropriate industry structures and non-viable product features. Medina Angarita and Nolte (2020) demonstrate that project continuation in terms of entrepreneurship requires that both tangible and

intangible outcomes must work in tandem to support post-hackathon long term project continuation.

To ensure project continuance therefore, organisations will have to mediate the longer-term interventions required to support and grow the post-hackathon subset of participants with project continuation intentions. It is anticipated that this study will add more to this body of knowledge regarding project continuation. This will apply in particular to the post hackathon activities which different participants engage in, and the role of the post hackathon activities on project continuation.

2.3 Project continuation

Project continuation is an activity occurring post the hackathon event which further develops the prototype into a product or start-up which can be launched into the market. Most studies of hackathons have primarily focused on activities occurring before and during the hackathon event (Herbsleb et al., 2018; Kohne & Wehmeier, 2020; Nolte et al., 2020; Nolte et al., 2018). However, limited studies have focussed on post hackathon activities and the factors contributing to project continuation especially in a corporate environment (Leemet et al., 2021; Nolte et al., 2018; Pe Than et al., 2020; Uiga, 2019).

According to Flores et al. (2018), because hackathons are short and intensive events, post hackathon activities run the risk of being abandoned. Thus, in the overall assessment of the hackathon event, the organisers, participants, audience and stakeholders often rate the event as quite successful, despite falling short with the scaling of ideas (Komssi et al., 2015).

Alarmingly, Nolte et al. (2020) also reported that only 5% of all types of hackathons projects are still active after five months. These low project continuation rates persisted, whether the hackathon event was positioned as an individual learning, community building or entrepreneurial opportunity (Happonen et al., 2020; Medina Angarita & Nolte, 2021; Pogačar & Žižek, 2016; Poncette et al., 2020; Steglich et al., 2020). Findings like these reinforce the dissenting position that hackathon outcomes are not sustained at all beyond the hackathon (Cobham et al., 2017; Mantzavinou et al., 2018; Trainer et al., 2016).

In their analysis of a hackathon database, Nolte et al. (2020) proposed nine elements which positively influenced project continuation. These were team size, team familiarity, prior hackathon participation, skill matching, skill diversity, preparation activities, continuation intention, project complexity, and winning the hackathon. Lyonnet (2021) corroborated the results on collaboration and teamwork in a case study in the maritime sector. However, Uiga (2019) found that winning the hackathon was the only significant factor influencing project continuation post-hackathon. Unexpectedly, Nolte et al. (2020) found that smaller teams with a perceived lower coordination cost, team familiarity and prior hackathon participation did not support post-hackathon project continuation (see Figure 2-1 below):

	Continuation behavior		
	Short-term	Long-term	Neither
Task completion			
Small teams, lower coordination cost ($\mathbf{H}_1$)			X
Team familiarity, more efficient ($\mathbf{H}_2$)			X
Prior hackathon participation, realistic expectations ($\mathbf{H}_3$)			X
Skill fit helps to cope with technical challenges ($\mathbf{H}_4$)		X	
Skill diversity supports creativity, helps with progress on challenging tasks ($\mathbf{H}_5$)		X	
Preparation activities prior to hackathon make follow-up easier ($\mathbf{H}_6$)	X		
Motivation			
Continuation intentions are an indicator of motivation to continue ($\mathbf{H}_7$)		X	
Technical complexity sparks interest ($\mathbf{H}_8$)	X		
Prizes create motivation ($\mathbf{H}_9$)	X		
Short-term activity lowers probability of long-term continuation			

Figure 2-1: Overview of Continuation Behaviour Patterns

Source: Nolte et al. (2020, pp. 145:15)

In addition, even for teams which prepared before the event so that they could hit the ground running; the requisite technical complexity believed to spark interest and the rewards as motivation only delivered short-term project continuation which rapidly declined within six days of the hackathon (Nolte et al., 2020).

Nevertheless, project teams with a good skill fit to cope with technical challenges, appropriate skill diversity in support of creativity, and initially set intentions of

project continuation were found to have long-term post-hackathon project continuation (Nolte et al., 2020). In addition, activities which consulted potential stakeholders before and during the hackathon event created awareness and positively contributed to project placement and financial sponsorships (Nolte et al., 2018).

Organisations which realised any longer-term return on investment were those which engaged in post hackathon activities. These included lessons learned activities, setting time aside to assess ideas, and reflecting on prototypes developed during the hackathon event (Flores et al., 2018; Kohne & Wehmeier, 2020). However further to those activities, determinations needed to be made regarding which ideas could be further pursued or discarded. In certain instances, ideas could also be pursued where budget allocations have been provided for ideas with potential (Komssi et al., 2015). This study contributes to this body of knowledge by obtaining an understanding of the post hackathon activities participants engage in and their role in project continuation.

2.4 Analytical framework

This study is based on the framework by Nolte et al. (2020) which was an extension of the collaboration by open superposition theory which stated that volunteers will only continue working on a project if they determine that the project can be completed within an acceptable time period (Howison & Crowston, 2014).

Continuation behaviour of hackathons in the longer term was found to be strongly related to Task Completion (skill fit and skill diversity) and Motivation (continuation intentions) (Figure 2-2).

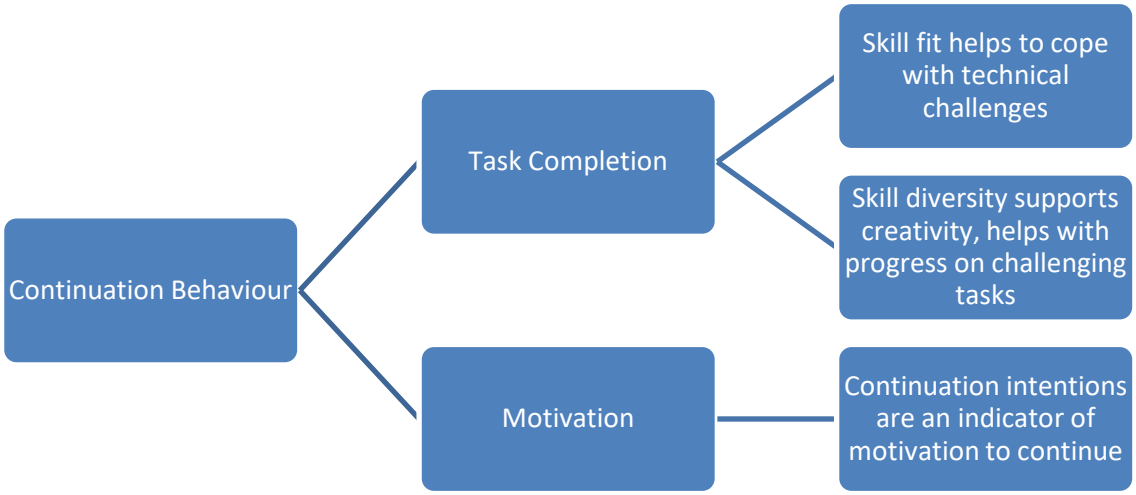

Figure 2-2:Aspects related to task completion & motivation

Source: Adapted from Nolte et al. (2020)

The three aspects are stated in full below as per Nolte et al. (2020):

The fit between a team's skills and project requirements will be positively associated with technical project continuation: A good fit between a team's skills and technical project requirements can support the team to deal with the technical challenges of a project and deliver a more refined product.

Skill diversity within a team will be positively associated with technical project continuation: Teamwork during a hackathon is about efficiently carrying out a project while simultaneously developing innovative ideas and artefacts.

A teams' continuation intentions related to their project will be positively associated with technical project continuation: The relationship between intention and behaviour has been well established through research in health, psychology and information systems.

2.5 Conclusion of literature review

The majority of hackathons happen in the community or educational space, with one-third of all hackathons occurring in the corporate space. Kohne and

Wehmeier (2020) identified that the main goals for open hackathons were to try out new ideas or technologies and promote start-ups. This was contrasted with internal hackathons meant to drive innovation, lead to the recruitment of new employees and teambuilding while positioning the organisation as innovative.

Further studies showed that there were both tangible and intangible outcomes resulting from a hackathon setting. Medina Angarita and Nolte (2020) systematically reviewed 91 peer reviewed journal and conference papers. This revealed that project continuation in terms of product/venture development required that tangible and intangible outcomes must work in tandem to support long term post-hackathon project continuation. Tangible outcomes included new prototypes, product features, new publications, while intangible outcomes included learning, networking and interdisciplinary collaboration leading to creative ideation.

Prior to taking part in the event, and to realise its success, the participants may need to determine and define their motivation and intended outcomes for participating. For example, project teams that had initial set intentions of project continuation were found to have more success (Nolte et al., 2018). In addition, teams which prepared prior to the event were able to hit the ground running and were therefore likely to continue with the project (Nolte et al., 2018). Lastly activities that involved consulting potential stakeholders before and during the hackathon event created awareness and positively contributed to project placement and financial sponsorships within the organisation.

Career aspirations were found to motivate participants whose goals were linked to recognition, and these participants tended to continue with their projects (Herbsleb et al., 2018). Reward prizes won during the event were also a motivation for project continuation as they gave the participants validation of the ideas they worked on. However, these activities focused more on the brief continuation of prototype refining rather than on long-term project continuation (Nolte et al., 2020). Moreover, teams would be more likely to continue working together after the hackathon if they develop good intra-team relationships (Ghouila et al., 2018). Nolte et al. (2020) also found that teams which had suitable

skill diversity and matching guided members on tasks to be worked on post the hackathon event increased the project's scope of influence.

Regarding the type of ideas, teams working intensively during a corporate hackathon to generate working prototypes which could become part of current products or be the foundation for new products or services have had project continuation success (Briscoe & Mulligan, 2014). Moreover, the viability of a project to continue after the hackathon would be primarily determined by consumer demand and the project's compatibility with existing products (Herbsleb et al., 2018). In contrast, ideas that did not align with the organisational strategy or product roadmaps, regardless of how innovative they were, could not attract funding towards project continuation (Komssi et al., 2015). Project teams with clear goals of having fun, networking, or learning new skills also did not pursue project continuation (Nolte et al., 2018). Furthermore, Nolte et al. (2018) found that teams whose ideas were too extreme did not pursue project continuation. There needed to be a balance in intensifying activities following a hackathon to avoid negatively impacting project continuation (Nolte et al. (2020).

Medina Angarita and Nolte (2020) reported six post-hackathon support measures. These included coaching and mentoring for the winning teams, a technical showcase of artefacts developed during an event at a relevant forum and post-hackathon prizes. Other incentives were the release of the productive version of technical artefacts recruitment of new team members, and grant writing. Unfortunately, research has not yet evolved to understand the impact of these activities on long term hackathon project continuation (Medina Angarita & Nolte, 2020:9).

Therefore, project continuation encourages realising of some outcomes and discourages idea abandonment (Komssi et al., 2015). Current project continuation post hackathon was low enough to be reported as low to no return on investment (which can be considerable in the corporate setting) (Cobham et al., 2017; Mantzavinou et al., 2018; McIntosh & Hardin, 2021; Trainer et al., 2016). Further, the top three aspects for long term project continuation post-hackathon were (Nolte et al., 2020):

- Project teams with a good skill fit to cope with technical challenges,
- Appropriate skill diversity in the team in support of creativity in the face of challenging tasks, and
- Teams had set intentions of project continuation.

This study followed existing research studies to evaluate motivation and intentions for participating in a hackathon event and the post hackathon activities undertaken by participants towards project continuance.

2.5.1 *Proposition 1*

The participants' continuation intentions are informed by their motivation and intended outcomes for participating in a hackathon event.

2.5.2 *Proposition 2*

Participants need to engage in post-hackathon activities in order for there to be project continuation post-hackathon events.

CHAPTER 3. RESEARCH METHODOLOGY

This chapter describes the methodology that was followed to address the propositions from the literature review.

3.1 Research approach

The study used a qualitative research approach consisting of semi-structured interviews for data collection.

Qualitative approaches are helpful when in-depth understanding of a phenomenon or subject is required from the perspective of people and the meanings the people have ascribed from the subject (Saunders et al., 2019). They assist in uncovering the fundamental motivations of human behaviour and provide insight into why humans behave in a certain way or even like or detest a specific thing (Kothari, 2009). Qualitative approaches are also often used in exploratory or descriptive research, and address challenges faced by organisations (Saunders et al., 2019; Schindler, 2019).

Therefore, the qualitative approach was selected to understand the role of post hackathon activities on project continuation as experienced by the participants of hackathon events. This was a cross-sectional study, as the research only collected a snapshot of information at one point in time.

3.2 Research design

In researching the role of post hackathon activities on project continuation within a telecommunications organisation, a case study method was used (Creswell & Creswell, 2018). This helped to understand the role of post hackathon activities on project continuation as experienced by the participants of hackathon events.

This study followed an interpretive technique to describe and understand the studied phenomena (Schindler, 2019). This approach was fitting, as it assisted in providing greater insight into the role of post hackathon activities on project continuation.

The unit of analysis refers to the objects which are researched and the level at which research is performed (Blumberg, Cooper & Schindler, 2008). For the research at hand, the unit of analysis was the individual participants who were interviewed and their experiences and perceptions of post-hackathon project continuation at Company X.

3.3 Data collection methods

Participants were invited to participate via email, and an information sheet was shared to provide context for the study (see Appendix A). The data was collected using semi-structured interviews targeted at participants in hackathons held from years 2018 to 2020 within the telecommunications organisation. The interview guide contained specific questions but also allowed for probing questions for more data enrichment based on the responses received (Schindler, 2019). The questions were adapted from the literature reviewed. In both instances, the academic supervisor was consulted to ensure that questions aligned with the research objectives. The interviews were audio recorded using Microsoft Teams.

Semi-structured interviews have several advantages (Saunders et al., 2019). Firstly, they assist in understanding why participants have particular preferences and attitudes towards the studied phenomena. Secondly, they are also important in the interpretivist technique, where further explanations may be required from the participants and can provide insight into other areas not covered that may assist in answering the research questions. Finally, they allow for complex and open-ended questions, and accommodate persons who prefer interviews to surveys or questionnaires.

3.4 Population and sample

3.4.1 *Population*

The population was comprised of twenty hackathon participants of Company X who took part in hackathon events between the years 2018 and 2020. The participants who attended the interviews were based in the African continent

(South Africa, Lesotho, Mozambique, Democratic Republic of Congo and Kenya) where the organisation has a presence. However due to the South African office having more employees, the South African market had a larger representation of participants who were interviewed.

3.4.2 *Sample and sampling method*

The study followed the non-probability sampling method with elements of both convenience and purposeful sampling. Convenience sampling was applicable because the participants were accessible through Company X, affording the researcher the freedom to select available participants who agreed to be interviewed (Schindler, 2019). The sample selection was also based on specific criteria, defined as purposeful sampling (Schindler, 2019). Purposeful sampling allowed the researcher to specifically select hackathon participants who either continued or did not continue with their projects post the hackathon event.

The sample was comprised of 20 participants representative of the hackathon team members across the various countries. This sample size was based on the study by Marshall et al. (2013) who recommended between 20 and 30 interviews to be held before saturation was reached. The sample size of 20 allowed for a wider selection of participants among the countries and provided a representative sample based on each operational company size.

3.5 The research instrument

The research instrument for this study was the interview guide in Appendix C, which comprised 14 questions.

There were four sections; the first of which gathered the organisation demographics of the participants. The second section focused on the intentions and intended outcomes for participation; the third section was completed only by participants who continued projects. The fourth section was completed only by participants who abandoned their projects post the hackathon event.

3.6 Procedure for data collection

The hackathon participants are governed by terms and conditions where they consent to their details being used for any purposes relating to the competition and/or the organisation. These conditions were considered when permission to conduct the research was requested. Following the granting of authorisation to conduct the research, the hackathon officer within Company X provided limited access to a secure database of hackathon projects containing the project name, team member names and team member country origin. The participants were then initially contacted either through email or Microsoft teams chat message prior to setting up the Microsoft teams meeting invitations.

The semi-structured interviews were audio-recorded and held over Microsoft Teams at a time convenient for the participants. The participants were requested to provide an audio consent. This was based on the contents of the agreement form (Appendix B), their agreement to participate in the study, and their willingness for their responses to be recorded.

Each participant was advised that their identity would remain anonymous and their responses would be represented as participant 1, 2 etc. The participants were further advised that their responses would be kept securely within the University and Organisations' SharePoint and will be discarded after a period of five years. During the interview session, the context of the study was first provided to each participant (Appendix A), and permission to record the session was also obtained from them. Thereafter, questions were asked according to the interview guide while allowing for possible probing based on the responses provided by the participants. Notes were also taken during the interview; however, complete transcripts were also made from the full captured recordings.

3.7 Data analysis and interpretation

The data was analysed and interpreted using thematic analysis. This approach is preferred for analysing qualitative data due to its ability to identify, analyse and report patterns and themes (Braun & Clarke, 2006).

Each recording was transcribed word for word in preparation for thematic analysis, where initial codes were identified to be used for the first coding. The codes were grouped into themes based on the identified patterns. These were then reviewed to determine which ones would still be relevant and which ones would be used as a collective or even further divided into other themes. Thereafter the themes were mapped and interpreted according to the research to elaborate on the role of post hackathon activities on project continuation.

3.8 Limitations of the study

- Participants' selection was based on the accessibility of these individuals through Company X's database and the consideration of their suitability to contribute to the research study.
- Unconscious bias might have been evident in the questions and design.
- Response bias was considered a possibility. Participants might have been too embarrassed to admit why they did not continue with the projects post-hackathon as they might have felt that it reflected on them.
- The cross-sectional nature of this research presented a snapshot at a particular point in time. Different responses might be obtained in a different time frame due to circumstances like a change in approach to hackathons.

3.9 Transferability and dependability

3.9.1 *Credibility*

Credibility is defined as the trust that is attributed to the accuracy of the research outcomes (Anney, 2014). Credibility determines whether or not the study findings represent credible information derived from the original data of the participants and are a correct interpretation of the participants' original opinions (Anney, 2014). Credibility was demonstrated by ensuring that the research findings and formulations emanated from the answers and opinions provided by the participants.

3.9.2 Transferability

According to Anney (2014), transferability is the degree to which the findings of qualitative research may be used in various situations with different participants. It is achieved when the researcher offers a clear explanation of the study and chooses participants purposively.

To ensure the transferability of qualitative research, data specific to the role that post hackathon activities have on project continuation in organisations were collected, allowing for the context to be possibly transferable to other similar contexts. The data collection approach produced a thick description of the context in order to make a judgment about how it would fit in with other possible contexts. With regard to purposive sampling relating to this study, groups of individuals who participated in hackathons with Company X in the years from 2018 to 2020 were selected.

3.9.3 Dependability

Dependability is the consistency of results over time; entailing how the data received from the study participants informs the findings, interpretations and recommendations (Anney, 2014). Dependability is achieved by an audit trail, a code-recode strategy, and stepwise replication or peer review.

The audit trail was used to demonstrate dependability in this study due to the fact that the transcripts of participants' responses were stored. In addition, the researcher pointed out the process for the collection, recording and analysis of all the data.

3.9.4 Confirmability

Confirmability refers to the extent to which other researchers can confirm the survey results, thus demonstrating that the interpretation of the data and results is clearly derived from the data and not something the researcher made up (Anney, 2014). It is achieved through an audit trail, reflexive journal and triangulation. The reflective journal and triangulation strategy was not applicable

for this study; however, objectivity was demonstrated through the analysis of the recorded and thematic analysis of the data.

3.10 Demographic profile of participants

The only information collected as per the interview guide (Appendix C) was:

a) How many years have you worked in Company X?

b) What is the division/functional area and country that you work in?

c) How many hackathon events have you participated in at Company X?

3.11 Ethical considerations

3.11.1 *Ensuring participants have given informed consent*

The purpose of the study and interviews was explained to all the participants prior to the interview. They were requested to provide an audio consent, based on an agreement form, giving their consent for: participation in the study; for audio recording the interview; and for their data to be used for analysis.

3.11.2 *Ensuring no harm to participants*

The research did not have any unintended consequences or cause harm to the participants, organisation or university.

3.11.3 *Ensuring anonymity and confidentiality*

Anonymity and confidentiality was afforded to the participants, organisation and university. The participants were identified through pseudonyms such as Participant 1. Furthermore, the organisation's name was not included in the final report but was referred as Company X . Furthermore, the organisation permission letter was excluded in this final report to protect its identity.

3.11.4 *Ensuring permission is obtained*

The Data collection for the research followed the prescribed standards and commenced after obtaining the ethics clearance approval from the Wits Business School. Permission to conduct the study was also sought from the organisation concerned which responded to the researcher in writing with a signed research permission letter according to the university's requirements.

Table 3-1: Consistency table: research questions, propositions, data collection and data analysis

Sub-problems	Literature Review	Propositions	Data collection tool	Analysis
Evaluate the participants' motivation and intended outcomes for participating in hackathon events and linkage to project continuation.	Nolte et al. (2018)	The participants' continuation intentions were informed by their motivation and intended outcomes for participating in a hackathon event.	Interview questions: 1, 2, 3, 4, 18	Thematic analysis
Identify the post hackathon activities and the role the post hackathon activities had on project continuation.	Medina Angarita and Nolte (2020)	Participants needed to engage in post-hackathon activities in order for there to be project continuation post-hackathon events.	Interview questions: 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17	Thematic analysis

Source: Author's own.

CHAPTER 4. PRESENTATION OF FINDINGS

4.1 Introduction

The focus of the research was to study the role of post hackathon activities on project continuation within hackathon events hosted by corporates in particular an organisation within the telecommunications industry. This chapter begins with the findings from the semi-structured interviews held with employees from Company X pertaining to the propositions that were presented in Chapter 2 and concludes with the summary of the findings. The presentation of the findings is guided by the two themes that emanated from the interview transcript analysis, namely:

- Motivation and intended outcomes for participation
- Project continuation process

Table 4-1 displays the themes that emerged from the coding analysis of the interview transcripts.

Table 4-1: Coding analysis output

Category	Theme	Propositions
- Motivation - Intended Outcomes	Motivation and intended outcomes	The participants' continuation intentions are informed by their motivation and intended outcomes for participating in a hackathon event.
- Budget allocation - Team skills and diversity - Project integration	Project continuation process	Participants need to engage in post-hackathon activities in order for there to be project continuation after the hackathon events.

Source: Author's own.

4.2 Results pertaining to Proposition 1

4.2.1 *Motivation and intended outcomes for participation*

The participants' initial motivation and intended outcomes for participating in a hackathon are presented; and how these influenced their continuation behaviour on their projects post the hackathon event.

4.2.1.1 Motivation for participation

The participants emphasised that their decisions to participate in innovation events such as hackathons were motivated by the need to:

- bring innovative ideas to solve the problems encountered on a day-to-day basis;
- have fun while innovating; and
- Win or be rewarded for innovative ideas

The majority of the participants highlighted problem solving as the motivation to participate in a hackathon while using innovative ideas to solve day-to-day problems. The participants also reported that they recognised an opportunity to encourage a culture of innovation. The statements below reflect these views:

> **Participant 2**: "To really sell a solution that is alternative to day to day thinking and also team participation, encouraging members to become innovative and creating a culture of innovation in my own team so that was really the driver."
>
> **Participant 3**: "To be part of the solution provider to the issues that we as the Fraud Department had at that time."
>
> **Participant 15**: "the culture of innovation, the culture of experimenting with new ideas and the culture of using technology to solve everyday problems."

Participant 19: **“**my intention basically, I wanted to have something which I can see working in the market and impacting the lives of people but also bringing revenue to company**”**

Furthermore, the participants indicated that their participation was motivated by the expectation of having fun and the thrill of participating in an innovation event. These perceptions are reflected by the following statements:

Participant 3: “That first time experience and the vibe and interacting with other people.”

Participant 5: “It was the first time the organisation was hosting a hackathon, so I just also wanted to be part of the hackathon. I did not really know what the hackathon was all about, but I just wanted to be part of it.”

Participant 9: “to have fun and see if we could win the prize money”

Lastly, the participants highlighted reward and winning as the third motivation for participating. The sentiments are expressed by the following statements:

Participant 3: “win the hackathon and seeing our idea being implemented within the organization.”

Participant 9: “to have fun and see if we could win the prize money.”

Participant 14: “seeing that idea winning and the people liking that idea and this idea being implemented within the organization.”

Participant 16: “I think the prize money was of course a big motivation.”

Participant 18: “Of course money held more weight as an incentive than the other things, because I mean, hey, we live in a world where money moves everything, so it was one of the things that ticked my box to enter the hackathon.”

4.2.1.2 Intended Outcomes

This section presents results from interviews relating to the participants' intended outcomes for participation. The participants indicated that the main intended outcome for taking part in a hackathon was to be able to implement their project that would be either introducing a new or enhancing an existing business process/product.

The participants indicated that, while their ideas were meant to solve the current challenges, the intended outcome was to introduce a new business process or improve the current ones that they had identified as having gaps. The perceptions are reflected by the following expressions:

> **Participant 1**: "the intention was to improve the current processes to a better process that will benefit both, users and customers."
>
> **Participant 7**: "To improve customer experience by improving the business process and also if we improve the customer experience by streamlining the business process, we will therefore avoid unnecessary calls coming into the call centres."
>
> **Participant 18**: "the idea was more global based than it was, local, so it was more of we're trying to solve an issue"

The participants further highlighted the intended outcome for participation to be project continuation resulting in the project being "live in the market." These sentiments are expressed by the following supportive statements:

> **Participant 2**: "seeing our idea being implemented within the organization."
>
> **Participant 3**: "win the hackathon and seeing our idea being implemented within the organization."
>
> **Participant 11**: "was primarily to bring our project to life. Yes, and win maybe, of course."

Participant 14: “seeing that idea winning and the people liking that idea and this idea being implemented within the organization.”

Participant 16: “The only real benefit out of it is not necessarily the money, but seeing your product live in the market.”

In addition, the participants indicated that project continuation would be made possible only through the buy in from EXCO and the business:

Participant 6: “We had thought about if we didn't win then we can still get the buy in from the business people to take this through.”

Participant 11: “we were asked to present our solution to the EXCO members. And we sent the presentation, but unfortunately we never got the opportunity to go and present it.”

Participant 13: “I think we could have had more support in terms of accompanying us to implement the project, so the one thing is the pressure on EXCO level. Another thing is the support to the team for each level of implementation of the project which wasn't done. The EXCO just did not push for it because they did not feel the pressure to do so.”

Participant 18: “Well, the expectation was more on that the local company, or the local business will up take that idea and try to build from it and see where we can improve.”

Participant 18: “we had already documented it and sort of like giving an overview idea of what we're doing, and that was submitted to the ideas chamber. Unfortunately, you have to wait to see if there will be somebody taking it up. There was no follow up on our end to say, you know, hey we had this idea. Is anybody looking at it?”

Similarly **Participant 20** had no intentions of project continuation due to the lack of support he received from his EXCO, as a contractor, for an idea he previously submitted:

Participant 20: **"**I was only trying my luck and I wasn't expecting much support from EXCO, the Core networks and the vast team or rather the developers. I wasn't expecting much because I have a solution that I came up with in 2019 which was acknowledged to be good but because when you are outsourced you don't really get that much support as compared to the guys who are permanent I had to run around for it"

4.3 Results pertaining to Proposition 2

This section presents the findings regarding the second proposition which obtained an understanding of the post hackathon activities the participants engaged in and the role those had on the project continuation process.

4.3.1 *Project continuation process*

The participants expressed their views on the activities they engaged in post the hackathon event and highlighted the role which those activities played in project continuation. There were three categories of post hackathon activities emanating from the transcript analysis that were identified to play a role on project continuation, displayed in Fig 4-1:

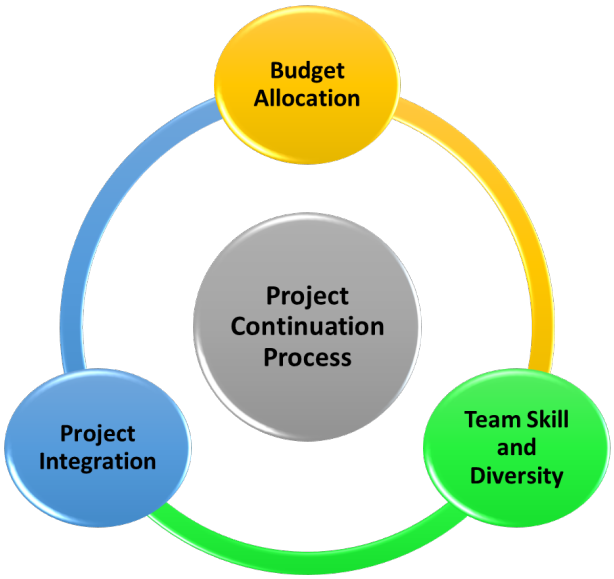

Figure 4-1: Post hackathon activities having a role on project continuation

Source: Author's own.

4.3.1.1 Budget allocation

In order for project continuation to occur, one of the activities the hackathon participants engaged in was to source finances that could be allocated towards their projects. The absence of an allocated budget meant delays in project continuation.

The participants reflected that it was challenging to continue working on their projects without an allocated budget with the projects being placed on a backlog list as the focus was on other projects. These reflections are expressed by the following statements:

> **Participant 2**: “The cost implication you're going to be carrying on your own and it became clear that the executives were more interested in investing in those hackathon ideas that had won and took ownership on those.”
>
> **Participant 8**: “a manpower issue, which cuts through budget in that the item was in the backlog, but we could not get traction because the focus was on other things.”

The participants felt that project continuation would have been a success had there been an allocated budget from the hackathon programme. This budget would be specifically directed at projects that had been selected to partake in the hackathon. The participants expressed their views through the following statements:

> **Participant 7**: “there was no budget from the hackathon team to have us seconded to those teams or any support to help us influence and implement a solution. In literal terms it meant our efforts were at a standstill.”
>
> **Participant 8:** “It would have been great if there was a budget support because I tell you what, that would have accelerated our efforts. We would have scaled up very quickly.”

Participant 10: “It would have been a lot easier if there was separate budget for more resources allocation to look at some of the technical challenges and also some of the business requirements analysis and things like that. It might have helped to allocate more budget to that.”

The participants also reported the importance of obtaining project sponsorships for their hackathon projects prior to the hackathon event, and these views are reflected by the below contrasting statements:

Participant 15: “they did a good job of engaging even some of the business guys that they had in their teams where they ended up being their sponsors”

Participant 16: “We didn't engage the sponsors on it from the word go so you realize by the time we're doing a hackathon it was not really a priority for them.”

4.3.1.2 Team skill and diversity

The participants were asked to report on the level of skill and diversity represented by the team members and how these skills fared when it came to project continuation. The participants reflected that the activity of selecting a team with appropriate skills and diversity was under-estimated. This was because, when they had thought that they had selected the right team member, they had challenges when it came to project continuation. These sentiments are reflected in the following statements:

Participant 6: “We would have needed a broader team to take the idea through, so the skills that we had were sufficient for the hackathon. But in terms of implementation, we needed other people involved.”

Participant 7: “no, not beyond the prototype”

Participant 13: “no, I think that we underestimated the challenge of the implementation of our own idea.”

Participant 17: “Actually I think it was luck or something, but I think I got the best team for that, now for implementation probably I will say I'll just need an additional resource”

One team, to which **Participant 19** belonged, successfully pursued project continuation due to the fact that the implementors were part of the hackathon team:

Participant 19: “Taking it live was very simple, because the same people whom I picked were already working within the same systems.”

4.3.1.3 Project integration

After the hackathon, the participants engaged in activities which ensured that their projects could be integrated into the organisation’s systems and processes.

The participants highlighted the need for their direct leadership to support and prioritise the continuation of their hackathon projects and the challenges which the absence of this support posed. The participants further mentioned how the projects they worked on encountered challenges with getting prioritisation. This resulted in some of these projects being abandoned or taking longer than anticipated to progress to implementation. These views are expressed in the following statements:

Participant 6: “Had our manager been also a keen on it there would have been more fight from them in terms of fighting with the other systems to make sure that this thing goes in into production. So, to sum it up, I would say management involvement should be as committed as the people that were involved in the hackathon about the idea.”

Participant 10: “Prioritization for the project was an issue because there were other high impact projects that took precedence.”

Participant 13: “I think we could have had more support in terms of accompanying us to implement the project, so the one thing is the pressure

on EXCO level. Another thing is support to us to the team for each level of implementation of the project which wasn't done."

Participant 13: "EXCO level it's not a problem of understanding, but it's a problem of priority. They just did not push for it because they did not feel the pressure to do so."

Participant 8 expressed that the prioritisation success achieved by their project was attributed to the fact that the Chief Risk Officer had an interest in it:

Participant 8: "Our idea had a lot of buy in, from our ME to start with he bought into the idea. It also had a buy in from the CRO, the head of fraud and risk. The fact that it had to buy in from that higher up meant that it received a lot of impetus and momentum so we could even proceed"

The participants further highlighted the fact that the same ideas seemed to exist within the organisation, and these were discovered once project continuation had commenced. For example, **Participant 5's** team discovered that another team within the organisation had already progressed with a similar project. Ultimately, the teams collaborated towards project continuation which resulted in a completed project, however **Participant 9's** team totally abandoned their project. The following reflect these statements:

Participant 5: "So when we presented the idea we realised there was another team that had sort of the similar ideas but although not exactly the same, so bits and pieces of our ideas, we took some of the ideas from the other teams and we sort of fused them together."

Participant 9: "Already being started by a different group that we weren't aware of, and they actually finished it."

The participants also mentioned their experiences of integrating their projects into the mainstream systems. The participants had challenges with regard to introducing a new technology, and these are presented by the following statements:

Participant 2: “There was no appetite to explore blockchain or invest in any blockchain because of a lack of understanding and no sort of use cases that are known before”

Participant 3: “The technology at that time was new to their organization. There were not a lot of systems that were running on the new technology. So basically, to the company this was more going to be a Capex expense.”

Participant 8: “So there was some architectural compliance that we needed to comply with or that were promised to be in existence that we needed to conform to and as development went by, we quickly discovered that stack was not ready.”

Participant 14: “enabling or creating that capability within the team for machine learning; and maybe after this capability being in place within the organisation that idea can be implemented.”

Participants 10 and 19 further mentioned the challenge of having to integrate a solution in the presence of complex systems:

Participant 10: “I would hope that there would be fewer dependencies on getting it into production. That it would more be a case of only one max two teams involved in terms of getting it into production. Because that would help reduce the complexity; deal with that complexity, just in terms of getting the use case in not sorting out all the different systems beforehand.”

Participant 19: “the way the project was we wanted to touch almost several products. We were planning to add value almost to all products we have but now the challenge was how to integrate with some old products. So, we had to start with only a few. I think we started dealing with like 3 products out of like 20 plus products. Which we have now. So due to integration challenges and a way some other products are in the readiness of other teams, we had to start with those products which were straight away and simple to do.”

In addition, **Participant 7** indicated the absence of centralised repositories for sourcing the latest data and process documentations, enabling the teams to confidently pursue project continuation.

> **Participant 7**: “there's a lack of benchmarked, centralized systems which makes it very difficult to source the right type of data. You might think you have the right type of data, but not right in a sense of it probably is not the latest updated data or the most comprehensive data that covers the problem conclusively”

> **Participant 7**: “documentation of those systems and processes is very lacking, right so it makes innovation a bit hard because you have to dig really deep. You literally cannot trust that the process that you're looking at is the correct flow of data.”

Participant 10 who successfully continued to work on the project highlighted that the success was due to intentionally re-using existing technology capabilities:

> **Participant 10**: “Some of the existing capabilities - reusing existing technology in terms of how the model gets built and exposed; so just re-using technology that's been used on other use cases”

Participant 19, whose team successfully continued to work on the project emphasised that the success was due to the project adding value to existing products:

> **Participant 19**: “it was adding value to existing products so that customers can be attracted to and now they could willingly purchase the product with the extra value added on the on top of those products”

4.4 Summary of the findings

This chapter provided insight into participants’ motivation and intended outcomes for participating in a hackathon. In addition, it also provided insight into the post hackathon activities that the participants engaged in for project continuation, and

in particular the role of post hackathon activities on project continuation. The findings are summarised below.

4.4.1 *Motivation and intended outcomes*

The participants indicated innovation and problem solving, fun and reward as the motivating factors for participating in a hackathon event. Of these, the need to solve business problems using innovative ways was the main motivation expressed. The participants were also excited to take part in a first of its kind event within the organisation and wanted to experience innovating while having fun. The promise of a reward for the best idea also became a significant motivation for participating, with the teams all hoping to walk away with one of the top prizes on offer.

The participants highlighted that intended outcomes for participating in an innovative event such as a hackathon were to improve the organisation's existing business processes. Fewer participants mentioned introducing new business processes; and to continue working on the project seeing them 'live' in the market. However, some participants felt that project continuation depended on EXCO 'buy in' and support, and the absence of this resulted in abandoned projects.

4.4.2 *Project continuation process*

The participants engaged in post hackathon activities with the intention to continue working on their own projects and pitched in during the hackathon event. In the process of working on and implementing the projects, the participants highlighted the role which post hackathon activities had on project continuation. The participants engaged in seeking budget allocations; selecting a team with appropriate skills and diversity and project integration activities.

The participants also emphasised that the absence of allocated budgets towards continuation meant their projects were at a standstill. If the hackathon organisers had set-aside some budgets solely focussing on the hackathon projects, then project continuations would have occurred. Moreover, the teams which secured sponsorship before the event took place had success in project continuation.

Team members selected, in some cases had the appropriate skill and diversity to participate in the hackathon, delivering a working prototype, however there was a requirement to source other team members for project implementation. The participants indicated that they had underestimated the kind of skills that would be further required for project implementation. However, the teams which had made sure that the implementors were selected as part of the team, continued to work on the project and successfully implemented the project.

Project integration plays a significant role in continuation, and project continuation was successful where the projects received priority due to management such as the Chief Risk Officer having an interest. In some instances, the existence of similar ideas within the organisation impacted on project prioritisation, as they pursued project continuation. This resulted in the hackathon project abandonment or collaboration between the teams to implement the project.

The participants further reported challenges faced with integrating their projects due to technology incompatibility and the complex systems and the lack of centralised repositories for the storage of data and process documents. The team which pursued project continuation was successful due to the project adding value to existing products.

CHAPTER 5. DISCUSSION OF THE FINDINGS

5.1 Introduction

This chapter discusses the findings detailed in Chapter 4. It starts with the demographic profile of the participants followed with a discussion centred on the two propositions. It concludes with a summary of the findings based on the propositions.

5.2 Demographic profile of participants

The demographic profile of the participants is represented in Table 5-1. Invitations were extended to participants in seven countries namely South Africa, Lesotho, Democratic Republic of Congo, Tanzania, Mozambique, Kenya and Ghana. However, participants from Ghana did not agree to be interviewed. Therefore, interviews were held with participants from six countries in Africa.

Table 5-1: The demographic profile of the participants

Participant	Nr of years	Participation year	Idea position	Country represented	Project Status
Participant 1	15	2019	First round	South Africa	Abandoned
Participant 2	18	2019	First round	South Africa	Abandoned
Participant 3	3	2019	First round	South Africa	Abandoned
Participant 4	11	2019	First round	South Africa	Abandoned
Participant 5	11	2018	Fifth	South Africa	Implemented
Participant 6	3	2019	First round	South Africa	Abandoned
Participant 7	4	2019	First round	South Africa	Abandoned
Participant 8	4	2020	Fourth	South Africa	In Progress
Participant 9	3	2019	Third	South Africa	Abandoned
Participant 10	3	2020	Fourth	South Africa	In Progress
Participant 11	3	2019	First round	DRC	Abandoned
Participant 12	7	2020	First round	DRC	Abandoned
Participant 13	4	2019	First round	DRC	Abandoned
Participant 14	2	2020	First round	Mozambique	In Progress

Participant	Nr of years	Participation year	Idea position	Country represented	Project Status
Participant 15	2	2020	Third	Kenya	Implemented
Participant 16	2	2020	First round	Kenya	Abandoned
Participant 17	11	2020	Second	Kenya	In Progress
Participant 18	10	2020	First round	Lesotho	Abandoned
Participant 19	9	2020	First round	Tanzania	Implemented
Participant 20	4	2020	First round	Lesotho	Abandoned

Source: Author's own.

The majority of the participants were based in South Africa, representing 50% of the study sample; this was followed by the DRC and Kenya each with 30% of representation. Lesotho had 10% representation and finally Mozambique and Tanzania each had 5% representation, as represented in Figure 5-1 below:

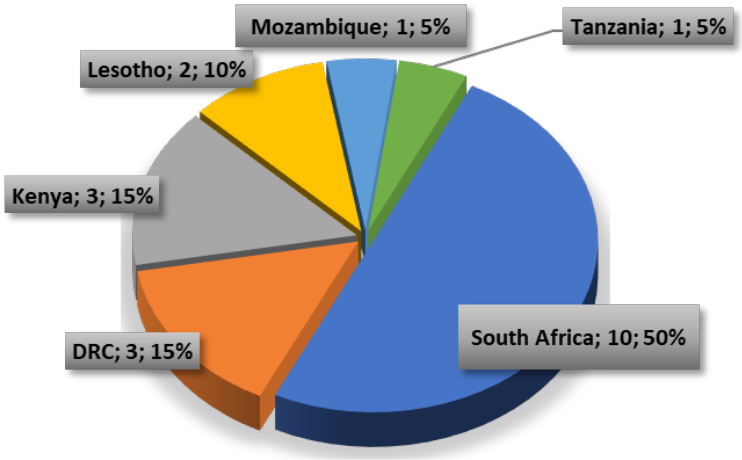

Figure 5-1: Number of participants/projects by Country

Source: Author's own.

The analysis revealed that the participants' views regarding intentions and outcomes were similar, regardless of the country they were based in. Moreover, participants engaged in similar post hackathon activities in pursuing project continuation.

In total twenty projects made up the study with 65% (13) of projects abandoned. Seven projects were continued with 3 already implemented and 4 currently in progress. Fig 5-2 represents the status of the projects by country:

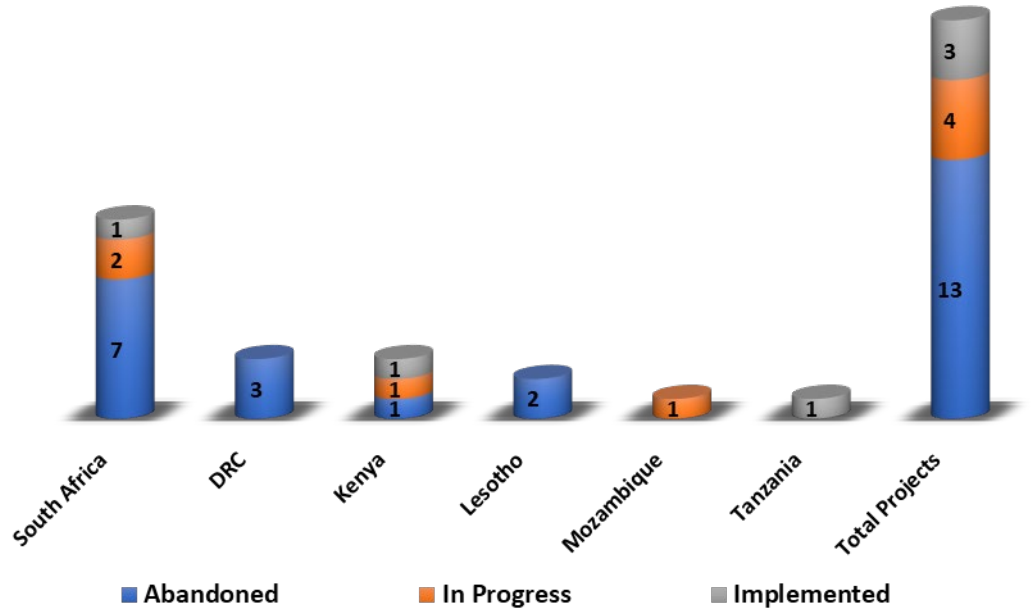

Figure 5-2: Project status represented by Country

Source: Author's own.

5.3 Discussion pertaining to Proposition 1

5.3.1 *Motivations and intended outcomes for participating in a hackathon*

This section discusses the motivation and intended outcomes for participating in a hackathon and their role on the project continuation, post the hackathon event.

One of the emerging findings from the analysis indicated that innovation and problem solving were a strong motivation for participating in a hackathon event. This finding is in line with the definition of hackathons as problem-solving, short-term events in which small groups collaborate to create a final product (Briscoe & Mulligan, 2014). They are therefore hosted to generate ideas and develop

revenue-making prototypes, thus providing solutions to business problems encountered (Komssi et al., 2015).

The reward aspect also featured as another motivation, where the participants noted that they were incentivised by the promise of reward for their best ideas. This result aligned with Nolte et al. (2020) who acknowledged a reward to be a motivation for project continuation; however this was a motivation for brief prototype refining rather than for long-term project continuation. The study revealed that only ideas selected in the top 5 received a monetary reward. The organisation publishes communications regarding the winning ideas publicly within its internal social media platforms such as organisation's workplace and email bulletins. The current findings contradict Nolte et al. (2018), as the 6 projects that received a reward represented 30% of all projects within the study, 83% of those projects were continued post the hackathon. Thus, the reward appeared to have been a significant motivation for continuation. These findings are presented in Table 5-2 below:

Table 5-2: Number of projects receiving a reward

Total number of projects	Number of projects receiving a reward	% of projects that received a reward	Number of projects continued	% Of continued projects that received a reward
20	6	30%	5	83%

Source: Author's own.

The element of having fun was also a motivation for participation, however the study by Nolte et al. (2018) found that teams which had fun, networking or learn new skills did not continue to work on their projects. The findings of the study support this notion, as only a third of projects of participants who specifically participated for fun purposes pursued project continuation. These findings are presented in Table 5-3 below:

Table 5-3: Number of participants motivated by fun

Total number of participants	Number of participants motivated by fun	% Participants motivated by fun	Number of projects continued	% Of continued projects for participants motivated by fun
20	3	15%	1	33%

Source: Author's own.

The introduction of new or enhanced existing business processes/products were revealed as the main intended outcomes for participation in a hackathon event. This strongly signifies the intention of project continuation, since the outcome is the introduction of new or enhanced existing business processes/products, hence, an expectation exists for continuation behaviour, since the intention has been specified.

Nonetheless, there are contrasting literature views regarding the relationship between continuation intentions and continuation behaviour. For instance, Nolte et al. (2020); Nolte et al. (2018) found a link between continuation intentions and continuation behaviour in a corporate environment. Carruthers (2014) and Leemet et al. (2021) on the contrary found no link between continuation intentions and behaviour in the case of civic hackathons in a corporate setting.

In the study, 90% (18) of the participants explicitly indicated project continuation intentions. In this category only 39% of the projects were continued post the hackathon, with 61% of projects being abandoned, possibly supporting the notion that there could be no link between continuation intention and behaviour, presented in Table 5-4.

Table 5-4: Number of participants indicating continuation intentions

Total number of participants	Number of participants indicating continuation intentions	% Participants indicating continuation intentions	Number of projects continued	% Of continued projects for participants indicating continuation intentions
20	18	90%	7	39%

Source: Author's own.

The abandonment of projects can be attributable a number of reasons. For example, this could be due to the inherent nature of hackathons being short and intensive events which focus on prototype building (Flores et al., 2018). They can also be attributable to the challenges encountered by participants while engaging in post hackathon activities (to be discussed under section 5.4.1).

5.4 Discussion pertaining to Proposition 2

5.4.1 *Project continuation process*

This section discusses the findings regarding the post hackathon activities which participants engaged in and their role on the project continuation process.

Hjalmarsson et al. (2014) identified lack of partner cooperation for technical development, lack of partner cooperation for knowledge transfer, hindering industry structures and nonviable product features as several challenges to implementation of ideas. Nolte et al. (2020) further proposed nine elements likely to positively influence project continuation. These included team size, team familiarity, prior hackathon participation, skill matching, skill diversity, preparation activities, continuation intention, project complexity and winning the hackathon.

In the context of Company X, the process of project continuation was guided by the post hackathon activities the participants engaged in and these post hackathon activities were earlier represented in Fig 4-1.

Budgets have to be made available for deployment of projects that require to be integrated into the organisation's systems; specially in the case of hackathon projects that involve the use of technology in building prototypes. In Company X, the hackathon organisers had not allocated any funding towards the projects, but rather left the participants to seek funding through their own efforts. The hackathon organisers thus anticipated that participants' business units would budget for the deployment of these projects. The findings highlighted the need for allocated budgets to be made available for the deployment of hackathon projects. Consequently, where there was an absence of budget allocations, the projects could not continue and were ultimately abandoned.

The study by Komssi et al. (2015) suggested that only ideas with potential and allocated budgets should be pursued. However, within Company X there was no indication that determinations were made regarding which projects should be pursued. Where potential stakeholders were consulted before and during the hackathon, those projects found project placement and financial sponsorships within the organisation (Nolte et al., 2018). Therefore, the findings confirmed that the teams who had secured sponsorships prior to the hackathon event had success with project continuation.

Teams participating in the hackathon which focussed their activities on building non-functioning prototypes that were ready to be presented in the hackathon event were compared with those same teams which did not further develop the prototypes for project continuation. It was found that teams which had selected capable members focussed on building functioning prototypes continued to work on their projects post the hackathon. This aligns with Leemet et al., (2021); Nolte et al., (2018) who found that teams building functional prototypes pursued project continuation post the hackathon. This was particularly evident where the teams were made up of developers already working on the systems the projects impacted and who were therefore able to actively pursue project continuation (Nolte et al., 2018).

Regarding the activity of project integration, the study found that projects requiring new technology were discontinued due to the realisation that the organisation was not able to invest in a new untested technology with unknown business cases. Similarly, the study found that introducing a new business product took longer than expected, as more research was required to support the business case for launching the new product. The projects that were continued were those adding value to existing products and those re-using existing technology with known use cases. These findings supported studies where teams which had built prototypes that could be incorporated into current products continued to work on their projects (Herbsleb et al., 2018; Komssi et al., 2015). Further to this, teams where ideas were found to be too extreme were unable to continue working on the projects (Nolte et al., 2018).

Company X maintains a production increment process in which meetings are convened on a quarterly basis between Executives, Product Managers, IT Managers, and other stakeholders. The purpose of these is to discuss the prioritisation of projects to be deployed into the organisation's production systems in the coming quarter. This process manages all system enhancements to be deployed concerning new processes/products and improvements to existing ones. In this meeting, based on system resource availability, it is decided which projects will be next deployed and which will go into a backlog bucket, where they would be deployed in the future, based on available deployment capacity.

The study found that management commitment was required to ensure that the hackathon projects could also be prioritised for deployment. Participants had to request their own managers to include hackathon projects in the business departments list to be considered for production deployment. However, the participants found that their own hackathon projects were not considered for prioritisation because of limited system resource availability. In addition, the implication was that the team’s projects would be put on backlog to make way for a hackathon project that the department might later on not be interested in.

In their study Leemet et al. (2021) highlighted the importance of corporate commitment in terms of resource allocation to ensure project continuation. This kind of commitment is what Company X requires to ensure project continuation;

however these commitments would need to be communicated with the respective business departments prior to the hackathon event. However, this element has not been covered in depth in earlier studies on hackathon project continuation.

5.5 Conclusion

The findings show innovation and problem solving, fun and reward as the motivating factors for participating in a hackathon event, nevertheless, participants who partake for reasons of having fun do not continue working on their projects. The intended outcomes for participation were to improve or introduce new business processes while continuing working on the projects until they were deployed into the organisation's production systems, thus implying a continuation behaviour. However, the results showed no link between continuation intentions and continuation behaviour.

The results found that the participants engaged in post hackathon activities while pursuing project continuation. However, they had to seek funding for the purpose of project continuation resulting in projects being abandoned due to lack of funding allocations. This highlighted the importance of projects being allocated financial support to enable them to continue. Project continuation was successful, where functional prototypes were developed in the hackathon and team members were intentionally selected to work on the systems that the hackathon idea impacted. Lastly the activity of integration was successful for projects that were adding value to existing products or re-using existing technology with known use cases. Integration was also successful for those teams where management prioritised the hackathon projects in the organisation's program increment process. The findings also revealed a critical dependence on management support in enabling and ensuring project continuation.

CHAPTER 6. CONCLUSIONS & RECOMMENDATIONS

6.1 Introduction

The study set out to examine the role of post hackathon activities on project continuation in a telecommunications organisation. The research objectives:

- Evaluated the participants' motivation and intended outcomes for participating in hackathon events and linkage to project continuation
- Identified the participants' post hackathon activities and the role the post hackathon activities have on project continuation.

The study was conducted as a case study and was focussed on the employees participating in hackathon events held between the years 2018 and 2020 within a telecommunications organisation. The organisation of interest has presence in a number of African countries (South Africa, Lesotho, Democratic Republic of Congo, Tanzania, Mozambique, Kenya and Ghana) and hosted hackathons as a means to drive innovation. Semi-structured virtual interviews were held over MS Teams with twenty hackathon participants across the African continent with the intention of gathering the participants' views regarding their hackathon projects.

This chapter provides a summary of the research findings and the conclusions related to each of the research objectives. It then offers recommendations and concludes, with suggestions for future research.

6.2 Conclusions regarding research objective 1

As mention in Chapter 2, proposition 1 states: The participants' continuation intentions are informed by their motivation and intended outcomes for participating in a hackathon event. The objective was then to evaluate the motivation and intended outcomes for participating in hackathon events and linkage to project continuation.

The findings revealed innovation and problem solving, fun and reward as the motivating factors for participating in a hackathon event. This motivation was found to be driven by the need to use innovative ways to solve problems encountered on a daily basis, and hackathon events provided this innovation platform.

The motivation to participate was further driven by the prospect of being rewarded for the innovative idea. The study revealed reward to be the motivation which encouraged project continuation and resulted in some of those projects being implemented. This therefore suggested the likelihood of a linkage between winning a reward and project continuation, in contrast with prior literature. This success could likely be explained by the added awareness that winning projects are given through the numerous announcements made on the organisation's internal social media platforms such as the workplace and through emails. On the other hand, where fun was indicated as a motivation for participation, the study found that as an element that discouraged project continuation. Therefore the study found reward to be the motivation that likely supported project continuation.

The study found that the intended outcomes for participation were to enhance the organisation's existing business processes or products; or to introduce new business processes or products; with this achievable through project continuation. The participants had project continuation intentions, nevertheless, only a few projects continued to be worked on post the hackathon. This resulted in a significant number of abandoned projects versus those the participants continued to work on.

The abandonment of projects could be possibly explained by a number of factors. According to the study, a number of identified reasons for abandoned projects were found to be in the post hackathon activities the participants engaged in while pursuing project continuation. The identified post hackathon activities were affected by factors such as the unavailability of funding for project continuation neither from the hackathon event budget nor from within the organisation. Furthermore, project integration challenges were encountered when integrating new products with unknown business cases. These post hackathon activities will be further discussed under section 6.3.

The significant number of abandoned projects could further be an indication of the absence of linkage between continuation intentions and continuation behaviour.

These findings indicate that continuation intentions are impacted by numerous factors and are not only informed by the motivation and intended outcomes for participating in a hackathon event, being in contradiction to Proposition 1. However, more research would be needed so as to further examine the relationship between continuation intentions and behaviour and how to address factors that may be impacting on continuation intentions.

6.3 Conclusions regarding research objective 2

Proposition 2 as mentioned in Chapter 2 states: Participants need to engage in post-hackathon activities in order for there to be project continuation post-hackathon events. In relation to this proposition, the objective was to identify the post hackathon activities and the role the post hackathon activities have on project continuation.

In the course of project continuation, the study highlighted a number of post hackathon activities which participants engaged in. These for instance included participants being engaged in seeking funding; selecting a team with appropriate skills and diversity and project integration activities. These findings are in support of Proposition 2 that stated that post hackathon activities would need to be engaged in for there to be project continuation.

Regarding the activity of seeking budgets allocated towards the deployment of projects, the study revealed a dependence on the allocation of funding. The absence of funding resulted in abandoned projects. It is impractical to expect that all hackathon projects can be funded and implemented, therefore determinations have to be made regarding which projects to pursue, while applying some continuation criteria. The study also found that financial sponsorships that were sourced and confirmed before the hackathon event enabled project continuation.

The findings showed the significance of selecting team members with appropriate skills and diversity not only for building a prototype for the hackathon event but also for project continuation. In other words, the project implementors also had to be part of the team for project continuation to be a success. They ensured that functioning prototypes were developed during the hackathon, and that these prototypes would be integrated with less challenges to production systems.

The study found that integrating projects which introduced new processes or products discouraged project continuation. Similarly, projects requiring new technology capabilities further discouraged project continuation, as these demanded additional funding. Project continuation was attained where projects added value to existing products or even those that were re-using existing technology. This finding further necessitates criteria which can be applied to determine the projects an organisation should pursue.

The study revealed the reliance of project integration on management commitment to prioritise hackathon projects within the organisations production deployment programs. The prioritisation was particularly significant if the projects were to be worked on for implementation but could only be possible where there were no resource constraints. Due to multiple projects competing for prioritisation, the research found that many hackathon projects ended up in the backlog buckets awaiting prioritisation.

6.4 Recommendations

The findings presented in this paper have the following implications for the hackathon organisers:

- **Continue to reward winning ideas**: Teams that were rewarded were found to be motivated to pursue project continuation.
- **Secure financial commitment and sponsorships prior to the hackathon event**: this will be beneficial for the purpose of project prioritisation and will lessen the burden on the participants to seek project funding.

- **Participating teams to include developers who can integrate the project into production systems:** Teams who developed functional prototypes ready for integration were encouraged to pursue project continuation.
- **Determine which projects to be continued (presented in Table 6-1)**: Florén et al. (2018) found that hackathons, essentially new product development processes with an extremely limited and ad-hoc timeframe, can only beat the intense time pressure and create a new functioning product by sustaining the temporal ambiguity through a minimal basis for coordination and solution cocreation. The framework by Florén et al. (2018), particularly the Evaluating-Phase Success Factors can be used to determine projects to be pursued. An environmental survey of the competitor landscape should be completed to determine whether similar products exist. Identifying of product champions and visionaries will make the organisation realise the strategic impact and value of the projects. A preliminary technology assessment must be done prior to committing resources to determine the product's viability. Lastly refining of ideas is critical so that any risks and issues can be identified.

Table 6-1: Measurement and evaluation of the conceptual framework: project-specific success factors

	Factor	Key questions	Ideal condition/situation
Evaluating-Phase Success Factors	Environmental scanning and analysis	Has the scanning process provided the necessary environmental knowledge for evaluation?	An effective scanning process exists for integrating broad external information into the project
	Idea visioning and product championing	Is the idea sufficiently visionary to promote ideas to different stakeholders?	Commitment of enthusiasts who enable linkage between project goals and the firm
	Preliminary technology assessment	Is the product's viability attainable based on the technological assessment?	Well defined technical requirements for reducing uncertainty
	Idea refinement	Can the individuals in the project communicate a clear solution?	Systematic approach to idea refinement in place
Defining-Phase Success Factors	Creation of a preliminary product concept	Is it possible to present a robust preliminary product definition for a clear understanding?	Clear visual presentation of early product concept for feedback and development
	Project priorities	Are priorities set for the key product features?	Significantly developed project requirements or priority list that ranks key product features
Formalizing-Phase Success Factors	Screening of the preliminary product Concept	Can the product concept be screened and evaluated?	Effective way to screen obvious no-go projects and go projects
	Cross-functional executive review committee	Is a cross-functional executive review committee involved in the evaluation?	Interests of different department and functional level are captured in the review committee

Source: Florén et al. (2018, pp. 413)

6.5 Suggestions for further research

The following have been identified for further research related to hackathons in the corporate environment:

- In support of increasing the development period to extend the longevity/impact of a hackathon, an investigation into the relationship between hackathon participants' continuation intentions and continuation behaviour would be useful. This would enable hackathon organisers to identify hackathon participants who, with the right support, would be able to continue the necessary work to deliver on the promise of the new functioning product/solution.
- To maximise the return on investment post hackathons, a worthwhile question would be how can organisations match the hackathon teams with internal organisational business units prior and after events? This is especially important where the organisation could have to integrate hackathon projects requiring the use of new technology
- Considering the high number of abandoned projects, what role can the organisers play to facilitate and track project continuation?

REFERENCES

Afuah, A. (2020). *Innovation management-strategies, implementation, and profits* (2nd ed.). Oxford University Press.

Alkema, P. J., Levitt, S. P., & Chen, J. Y. J. (2017). Agile and hackathons: a case study of emergent practices at the FNB codefest. In *Proceedings of the South African Institute of Computer Scientists and Information Technologists* (pp. 1-10).

Anney, V. N. (2014). Ensuring the quality of the findings of qualitative research: Looking at trustworthiness criteria. *Journal of Emerging Trends in Educational Research and Policy Studies, 5*(2), 272-281.

Blumberg, B., Cooper, D., & Schindler, P. (2008). "Quantitative and qualitative research", M. Hill, *Business Research Methods,* pp. 191-222. McGraw Hill.

Braun, V., & Clarke, V. (2006). Using thematic analysis in psychology. *Qualitative Research In Psychology*, *3*(2), 77-101.

Briscoe, G., & Mulligan, C. (2014). Digital innovation: The hackathon phenomenon.

Carruthers, A. (2014). Open data day hackathon 2014 at Edmonton public library. *Partnership: The Canadian Journal of Library and Information Practice and Research*, *9*(2), 1-13.

Cobham, D., Gowen, C., Jacques, K., Laurel, J., & Ringham, S. (2017). *FROM APPFEST TO ENTREPRENEURS: USING A HACKATHON EVENT TO SEED A UNIVERSITY STUDENT-LED ENTERPRISE*. https://doi.org/10.21125/inted.2017.0265

Creswell, J. W., & Creswell, J. D. (2018). *Research Design: Qualitative, Quantitative, and Mixed Methods Approaches* (5th Edition ed.). SAGE Publications.

Drucker, P. F. (2002). The discipline of innovation. *Harvard Business Review*, *80*(8), 95-102.

Falk, J., Kannabiran, G., & Hansen, N. (2021). What Do Hackathons Do? Understanding Participation in Hackathons Through Program Theory Analysis. In *Proceedings of the 2021 CHI Conference on Human Factors in Computing Systems* (pp. 1-16). https://doi.org/10.1145/3411764.3445198

Florén, H., Frishammar, J., Parida, V., & Wincent, J. (2018). Critical success factors in early new product development: a review and a conceptual model. *International Entrepreneurship and Management Journal*, *14*(2), 411-427. https://doi.org/10.1007/s11365-017-0458-3

Flores, M., Golob, M., Maklin, D., Herrera, M., Tucci, C., Al-Ashaab, A., Williams, L., Encinas, A., Martinez, V., Zaki, M., Sosa, M., & Pineda, K. (2018). How can hackathons accelerate corporate innovation? In *Proceedings of the 2021 CHI Conference on Human Factors in Computing Systems,* Seoul, Korea.

Flus, M., & Hurst, A. (2021). Design at hackathons: New opportunities for design research. *Design Science*, *7*(e4), 1-24.

Ghouila, A., Siwo, G., Domelevo Entfellner, J.-B., Panji, S., Button-Simons, K., Davis, S., Fadlelmola, F., Ferdig, M., Mulder, N., Kishk, A., & Isewon, I. (2018). Hackathons as a means of accelerating scientific discoveries and knowledge transfer. *Genome Research*, *28*(5), 759-765. https://doi.org/10.1101/gr.228460.117

Happonen, A., Minashkina, D., Nolte, A., & Angarita, M. A. M. (2020, May). Hackathons as a company–University collaboration tool to boost circularity innovations and digitalization enhanced sustainability. In *AIP Conference Proceedings* (Vol. 2233, No. 1, p. 050009). AIP Publishing LLC.

Herbsleb, J., Pe Than, E. P. P., Nolte, A., Filippova, A., Bird, C., & Scallen, S. (2018). Designing corporate hackathons with a purpose. *IEEE Software*, *36*(1), 15-22. https://doi.org/10.1109/MS.2018.290110547

Hjalmarsson, A., Johannesson, P., Juell-Skielse, G., & Rudmark, D. (2014). Beyond innovation contests: A framework of Barriers To Open Innovation Of Digital Services. In *ECIS 14 22nd European Conference on Information Systems, Tel Aviv, 5-13 June 2014*.

Howison, J., & Crowston, K. (2014). Collaboration Through Open Superposition: A Theory of the Open Source Way. *MIS Quarterly*, *38*(1), 29-50. https://www.jstor.org/stable/26554867

Kienzler, H. (2016). Learning through inquiry: A global health hackathon. *Teaching in Higher Education*, *22*(2), 129-142. https://doi.org/10.1080/13562517.2016.1221805

Kitsios, F., & Kamariotou, M. (2019a). Beyond Open data hackathons: Exploring digital innovation success. *Information*, *10(7)*, 235-244. https://doi.org/10.3390/info10070235

Kitsios, F., & Kamariotou, M. (2019b). Digital Innovation and Open Data Hackathons Success: A Comparative Descriptive Study. In *Proceedings of the 2019 European Triple Helix Congress on Responsible Innovation & Entrepreneurship (EHTAC2019), Thessaloniki, Greece*.

Kohne, A., & Wehmeier, V. (2020). *Hackathons: From Idea to Successful Implementation* (1st edition). Springer International Publishing.

Komssi, M., Pichlis, D., Raatikainen, M., Kindstrom, K., & Järvinen, J. (2015). What are hackathons for? *IEEE Software*, *32*(5), 60-67. https://doi.org/10.1109/MS.2014.78

Kothari, C. R. (2009). *Research Methodology: Methods and Techniques*. New Age Publications (Academic).

Leclair, P. (2015). Hackathons: A jump start for innovation. *Public Manager*, *44*(1), 12-14.

Leemet, A., Milani, F., & Nolte, A. (2021). Utilizing Hackathons to Foster Sustainable Product Innovation -The Case of a Corporate Hackathon Series. In *2021 IEEE/ACM 13th International Workshop on Cooperative and Human Aspects of Software Engineering (CHASE)* (pp. 51-60). https://doi.org/10.1109/CHASE52884.2021.00014

Lifshitz-Assaf, H., Lebovitz, S., & Zalmanson, L. (2021). Minimal and adaptive coordination: How hackathons' projects accelerate innovation without killing it. Academy of Management Journal, 64(3), 684-715.

Lyonnet, B. (2021, December). Hackathon Approach: Its Contributions on Collaboration and Teamwork Skills: A Case Study in Maritime Sector. In *2021 4th International Conference on Education Technology Management* (pp. 91-98).

Mantzavinou, A., Ranger, B., Gudapakkam, S., Hutchins, K., Bailey, E., & Olson, K. (2018). Health Hackathons Drive Affordable Medical Technology Innovation Through Community Engagement. In *UNESCO Chair Conference on Technologies for Development* (pp. 87-95). Springer, Cham. https://doi.org/10.1007/978-3-319-91068-0_8

Marshall, B., Cardon, P., Poddar, A., & Fontenot, R. (2013). Does sample size matter in qualitative research?: A review of qualitative interviews in research. *Journal of Computer Information Systems*, *54*(1), 11-22. https://doi.org/10.1080/08874417.2013.11645667

Medina Angarita, M. A., & Nolte, A. (2020). What Do We Know About Hackathon Outcomes and How to Support Them? – A Systematic Literature Review. In *International Conference on Collaboration Technologies and Social Computing* (pp. 50-64). Springer, Cham. https://doi.org/10.1007/978-3-030-58157-2_4

Medina Angarita, M. A., & Nolte, A. (2021). Supporting Entrepreneurship with Hackathons - A Study on Startup Founders Attending Hackathons. In: Wang, X., Martini, A., Nguyen-Duc, A., Stray, V. (eds) *Software*

Business. ICSOB 2021. Lecture Notes in Business Information Processing, vol 434. Springer, Cham. https://doi.org/10.1007/978-3-030-91983-2_9

McIntosh, L., & Hardin, C. D. (2021). Do Hackathon Projects Change the World? An Empirical Analysis of GitHub Repositories. In *Proceedings of the 52nd ACM Technical Symposium on Computer Science Education* (pp. 879-885). Retrieved from: https://dl.acm.org/doi/abs/10.1145/3408877.3432435

Mielikäinen, M., Angelva, J., & Tepsa, T. (2018). Hackathon as a kickstart for integrated ICT engineering. In *Proceedings of the 46th SEFI Annual Conference* (pp. 1073-1080).

Nolte, A., Chounta, I.-A., & Herbsleb, J. D. (2020). What Happens to All These Hackathon Projects? Identifying Factors to Promote Hackathon Project Continuation. In *Proceedings of the ACM on Human-Computer Interaction*, *4*(CSCW2), 1-26.

Nolte, A., Pe Than, E. P. P., Filippova, A., Bird, C., Scallen, S., & Herbsleb, J. (2018). You Hacked and Now What? – Exploring Outcomes of a Corporate Hackathon. *2*(CSCW), 1-23. https://doi.org/10.1145/3274398

Pe Than, E. P. P., Nolte, A., Filippova, A., Bird, C., Scallen, S., & Herbsleb, J. (2020). Corporate Hackathons, How and why? A Multiple case study of motivation, projects proposal and selection, goal setting, coordination, and outcomes. *Human-Computer Interaction, 37*(4), 218-313. https://doi.org/10.1080/07370024.2020.1760869

Pogačar, K., & Žižek, A. (2016). Urban hackathon–alternative information based and participatory approach to urban development. *Procedia Engineering*, *161*, 1971-1976.

Poncette, A. S., Rojas, P. D., Hofferbert, J., Sosa, A. V., Balzer, F., & Braune, K. (2020). Hackathons as stepping stones in health care innovation: case

study with systematic recommendations. *Journal of Medical Internet Research*, *22*(3), e17004. doi: 10.2196/17004

Raatikainen, M., Komssi, M., Bianco, V., Kindstom, K., & Järvinen, J. (2013). Industrial Experiences of Organizing a Hackathon to Assess a Device-Centric Cloud Ecosystem. In *2013 IEEE 37th Annual Computer Software and Applications Conference* (pp. 790-799). https://doi.org/10.1109/COMPSAC.2013.130

Rosell, B., Kumar, S., & Shepherd, J. (2014, May). Unleashing innovation through internal hackathons. In *2014 IEEE Innovations in Technology Conference* (pp. 1-8). IEEE. doi: 10.1109/InnoTek.2014.6877369.

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

Schindler, P. S. (2019). *Business Research Methods* (13th edition). McGraw-Hill/Irwin.

Soltani, P., Pessi, K., Ahlin, K., & Wernered, I. (2014). Hackathon – a method for Digital Innovative Success: a Comparative Descriptive Study. In *Proceedings of the 8th European Conference on IS Management and Evaluation* (pp. 367-373).

Steglich, C., Salerno, L., Fernandes, T., Marczak, S., Dutra, A., Bacelo, A. P., & Trindade, C. (2020, October). Hackathons as a pedagogical strategy to engage students to learn and to adopt software engineering practices. In *Proceedings of the 34th Brazilian Symposium on Software Engineering* (pp. 670-679).

Stoltzfus, A., Rosenberg, M., Lapp, H., Budd, A., Cranston, K., Pontelli, E., Oliver, S., & Vos, R. (2017). Community and Code: Nine Lessons from Nine NESCent Hackathons. *F1000Research*, *6*(786), 1-24. https://doi.org/10.12688/f1000research.11429.1

Tang, T., & Vezzani, V. (2017). Fostering a culture of collaboration through playful Design Jams. In *UNIDCOM/IADE Proceedings of the 9th International Conference, Senses & Sensibility 2017: Design Beyond Borders and Rhizomes* (pp. 159-167).

Topi, H., & Tucker, A. (2014). *Computing Handbook, Third Edition: Information Systems and Information Technology* (3rd sdition). CRC Press.

Trainer, E., Kalyanasundaram, A., Chaihirunkarn, C., & Herbsleb, J. (2016). How to Hackathon: Socio-technical Tradeoffs in Brief, Intensive Collocation. In *proceedings of the 19th ACM conference on computer-supported cooperative work & social computing* (pp. 1118-1130). https://doi.org/10.1145/2818048.2819946

Uiga, K. M. (2019). What happens to all these hackathon projects? Master's Thesis. University of Tartu. Retrieved from: https://core.ac.uk/download/pdf/237084935.pdf

APPENDIX A – The participant information sheet

Good day,

My name is Zanele Ratsoga and I am a Masters student in Digital Business at the University of Witwatersrand, Johannesburg. As part of my studies, I have to undertake a research project and I am investigating: The role of post hackathon activities on project continuation in a telecommunications organisation under the supervision of Dr Mpho Raborife.

As part of this project, I would like to invite you to take part in an interview which will take around 60 minutes. With your permission I would like to audio record the interview using MS Teams. This recording will be stored on Sharepoint (University and Company) and only the researcher will have access to the recording which will be kept and deleted after 5 years.

There will be no personal cost to you if you participate in this project, you will not receive any direct benefits for participation but there are no disadvantages or penalties if you do not choose to participate or if you withdraw from the study. You may withdraw at any time or not answer any question if you do not want to. The interview will be completely confidential and anonymous as I will not be asking for your name or any identifying information, and the information you give to me will be held securely and not disclosed to anyone else. I will be using a pseudonym (false name) to represent your participation in my final research report. If you experience any distress or discomfort at any point in this process, we will stop the interview or resume another time.

If you have any questions during or afterwards about this research, feel free to contact me on the details below. This study will be written up as a research report which will be available online through the university library website. A summary of this report will be available upon request. The data collected from this research will be stored on Sharepoint (University and Organisation) and kept for a period of 5 years. With your permission the data collected from this research may be used by other researchers in an anonymised format. If you have any concerns or complaints regarding the ethical procedures of this study, you are welcome to contact the University Human Research Ethics Committee (Non-Medical), telephone +27(0) 11 717 1408, email: hrecnon-medical@wits.ac.za

Yours sincerely,

Researcher: Zanele Ratsoga, 2209209@students.wits.ac.za, +27795529669

Supervisor: Dr Mpho Raborife, mraborife@uj.ac.za, +27(0) 11 559 1336

APPENDIX B – Participant agreement form (blank)

Title of project: *The role of post hackathon activities on project continuation in a telecommunications organisation*

Name of researcher: Zanele Ratsoga

2209209@students.wits.ac.za | +27795529669

I, ……., agree to participate in this research project. The research has been explained to me and I understand what my participation will involve. I agree to the following:

(Please circle the relevant options below)

I agree that my participation will remain anonymous: YES NO

I agree that the researcher may use anonymous quotes in his / her research report: YES NO

I agree that the interview may be audio recorded: YES NO

I agree that the information I provide may be used anonymously after this project has ended, for academic purposes by other researchers, subject to their own ethics clearance being obtained: YES NO

…… (signature)

…… (name of participant)

…… (date)

…… (signature)

…… (name of person seeking consent)

…… (date)

APPENDIX C – Interview guide

Section A: Standard Participant Questions

a) How many years have you worked in Company X?
b) What is the division/functional area and country that you work in?
c) How many hackathon events have you participated in at Company X?

Section B: Project continuation intent

1. What was your motivation and intention to participate in the hackathon?
2. How did you and your team prepare for the event, including systems or processes the project would be impacted by?
3. Did you have intentions of working on the project post the event? Why?

Section C: Post hackathon activities – project continuation

4. Did the organisers provide any guidelines or terms of project continuation? What were those?
5. Do you believe your team had the appropriate skill fit and diversity for the chosen project? Why?
6. Did you encounter any challenges while working on the project? (system/people/processes/budget constraints)?
7. What are the specific activities that contributed to project continuation?
8. Were you required to provide regular project progress status to the organisers?
9. Is the project completed or still in progress or abandoned?
10. If abandoned, what other challenges did you experience?

Section D: Post hackathon activities – project discontinuation

11. What is the reason for not continuing?
12. What challenges did you encounter that discouraged project continuation? (system/people/processes/budget constraints)
13. Do you feel that there's something that could have been done to encourage project continuation?
14. Will you be participating in the next event? Why?

APPENDIX D – Ethics Approval

Graduate School of Business Administration
University of the Witwatersrand, Johannesburg

Wits Business School Ethics Committee
Constituted under the University Human Research Ethics Committee (Non-Medical)

Ethics Clearance Certificate

Ethics protocol number: WBS/DB2209209/701
This certificate is only valid with a legitimate ethics protocol number and signed by the Researcher (below)

Project title	The role of post hackathon activities on project continuation in telecommunications organisation
Investigator / Researcher	Ms Zanele Ratsoga
Nature of Project	MM (Digital Business)
Decision of the Committee	Approved, provided stakeholders and participants are guaranteed confidentiality.
Issue Date of Certificate	2021-11-11
Expiry date	Date of submission of the project report
Chairperson	Prof Anthony Stacey ☎ +27 11 717 3587 +27 82 880 4531 anthony.stacey@wits.ac.za

Declaration by Researcher

One copy must be signed by the Researcher and returned to the Chairperson of the Wits Business School Ethics Committee.

I fully understand the conditions under which I am authorized to carry out the abovementioned research I guarantee to ensure compliance with these conditions. Should any departure to be contemplated from t research procedure as approved I undertake to resubmit the protocol to the Committee.

Signature Date: