The influence of organisational learning on the digital maturity of South African banks

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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

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ABSTRACT

Due to technological advances influencing the financial services business, South African banks are investing billions of rands in learning. As a result of the fourth industrial revolution, the current unstable knowledge environment is reconfiguring the banking industry as we know it. The purpose of this quantitative study was to investigate the impact of organisational learning on the outcomes of digital maturity by investigating the relationship between internal and external knowledge acquisition tactics and digital maturity. Furthermore, the study analysed absorptive capacity's ability to moderate the influence of knowledge acquisition on digital maturity. According to the results of the study, South African banks are not yet reaping the benefits of their investment in knowledge acquisition because the new knowledge has not yet been incorporated at the organisational level. The study concluded that new knowledge that is not incorporated and combined with existing knowledge cannot positively influence digital maturity, nor can it increase potential absorptive capacity skills or moderate new knowledge that is not entrenched.

KEYWORDS

Absorptive capacity; Realised absorptive capacity, Potential absorptive capacity; Digital maturity; Knowledge acquisition; Internal knowledge development; External knowledge development.

DECLARATION

I, Angelique Joy Benjamin, declare that this research report is my own work except as 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 the Witwatersrand, Johannesburg. It has not been submitted before for any degree or examination in this or any other university.

Name: Angelique Benjamin Signature: 

Signed at ……Johannesburg……

On the ……8…….. day of ……June…… 2023…..

DEDICATION

I dedicate this research report to my beautiful children, Kristen and Daniel Benjamin, who inspire and motivate me.

ACKNOWLEDGEMENTS

This report was made possible with the support of my family, colleagues (past and present) and friends.

A special thank you to my supervisor, whose guidance helped me reach this point. I appreciated being able to benefit from your experience and expertise.

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I would like to conclude with a Big Thank You to the many past and present colleagues who responded to my survey requests and thank you to the banks that allowed me to survey their staff.

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ACAP	Absorptive Capacity
rhoC	Composite Reliability
PACAP	Potential Absorptive Capacity
RACAP	Realised Absorptive Capacity
rhoA	Reliability Coefficient

CHAPTER 1. INTRODUCTION

1.1 Statement of purpose

This research is a quantitative study that examined the influence of knowledge acquisition strategies to support the digital transformation outcomes of South African financial services organisations. The knowledge acquisition strategies must support the need for new knowledge by organisations to survive the existential threat posed by digitalisation. The insights drawn from the study can be used by all businesses that need to define or redefine strategies for knowledge acquisition as a result of digital transformation.

1.2 Background of the study

Disruptive technologies are superior systems that alter the way that consumers and industries operate by replacing existing systems and habits (Smith, 2002).

1.2.1 *The disruption of financial services*

A vortex pulls objects relentlessly toward its centre, where they may break apart and recombine as they collide (Global Center for Digital Business Transformation, 2021). The *Digital Vortex* is a biennial study that surveys industries most at risk for digital disruption to determine a ranking that shows the extent of disruption by industry. Media and Entertainment, Retail, Telecommunications, Technology Products and Services, and Financial Services have been at the centre of the *Digital Vortex* since the inaugural study in 2015.

In 2015, the World Economic Forum commissioned a project to understand the state of disruption in the financial services industry. The final report synthesised six high-level insights about the impact of technologically-driven innovation on the financial industry. These insights from McWaters (2015, p.13) are: a) incumbents will face disruption where the “greatest sources of customer friction meet the largest revenue pools”; b) data-driven platform-based innovations have the highest impact; c) disruption to the banking sector is imminent, but the insurance sector will be most affected; d) incumbents will “employ parallel strategies” that will allow them to compete with new entrants whilst deploying resources to exploit their legacy assets; e) regulators, incumbents and new entrants should collaborate to understand the positive and negative impact of innovation on the industry; and, lastly f) disruption is a continuous event that will “shape consumer behaviours” and the structure of organisations within the industry and the industry itself.

1.2.2 *The South African financial banking industry*

South Africa has a well-developed and well-regulated financial sector that offers a wide range of financial products and services. The sector is dominated by traditional financial service providers with large distribution networks that have captured most of the market (Genesis Analytics, 2019). In recent years, regulators have made it easier to obtain banking licenses, leading to born-digital market entrants.

1.2.3 *The impact of technological disruption on South African banks*

The South African banking sector is increasingly becoming more competitive due to the threat posed by digital-only entrants, FinTechs and BigTechs. FinTechs have challenged and successfully changed how banking services are provisioned and consumed by unbundling the banking value chain. Digital-only entrants build business models with digital technology at the core, and BigTechs, like Amazon, Facebook and Google, are a threat due to their financial resources and ability to scale (PWC, 2018; Genesis Analytics, 2019).

To transform existing capabilities, South African banks are spending billions of rand on learning initiatives in response to changes in the knowledge environment as a result of digitalisation.

1.3 Research problem

The South African banking industry is dominated by incumbent banks, and in response to digitalisation and technological disruption, these banks have embarked on large-scale digital transformation programmes to modernise their business models (Genesis, 2019).

Vial (2019) reviewed existing literature on digital transformation and used an inductive approach to define a framework to summarise knowledge on digital transformation and define the building blocks of the digital transformation process.

In the framework, changes in value creation paths due to the use of digital technologies as part of the strategic response of organisations are affected by structural changes. Structural changes are characterised by changes in organisational structure to effect cross-functional collaboration, organisational culture to improve agility, leadership to create new digital roles that will help foster a digital mindset, and employee roles and skills to develop the digital workforce.

Table 1.1 uses the structural changes dimension of the Vial (2019) framework to evaluate the digital transformation programmes at four South African banks. Desktop analysis of the annual integrated financial statements of these banks was used to obtain information about their structural changes in response to digital transformation programmes. The high-level analysis revealed that structural changes are a significant part of the strategic response of all four banks, and employee roles and skills have priority relative to the other dimensions. Therefore employee roles and skills were examined in more detail and tabled in Table 1.1. According to the data, collectively, these institutions spent more than R3 billion rand on learning in 2021. Data for FirstRand was not available from the company reports.

Table 1.1: Analysis of the learning activities of South African banks

Bank	Spend (R)	Items completed	Platforms	Innovation partnerships
Absa	449 million	6629	Absa Digital Campus Udemy Specialised academies for risk, compliance and cybersecurity	Partnerships with Elixirr, HYBR and SystemicLogic to extend access to ecosystems Wits, Henley, GetSmarter, MasterStart, AWS, Explore Data Science
Standard Bank	733 million	Five million	My Learning Standard Bank Insurance Academy	Massachusetts Institute of Technology Salesforce, Microsoft, Amazon, Fintech partnerships, Founders Factory Africa, Merchant Capital, Cloudbadger, Nomanini, Tesserae, iiDENTIFii, HelloChoice, 34 Fintech partnerships
Nedbank	1.1 billion	982 000 since 2002	LinkedIn learning	University of Johannesburg Fintech partnerships
FirstRand	864 million	Not available from report	Not available from report	Not available from report

*Table created with information from the integrated financial annual reports of the various companies from the 2021 financial year (Absa Group Limited, 2021; Standard Bank Group, 2021; Nedbank Group, 2021; FirstRand, 2021)

The company information reveals that in addition to developing internal workforces, these organisations are also investing in third-party partnerships with FinTechs and BigTechs to accelerate digital product and service development through the acquisition of third-party knowledge or external knowledge. Existing literature supports the positive impact of external knowledge development on the

outcomes of company performance and innovation, whereas there appears to be less literature on the impact of internal knowledge development on the outcomes of company performance and innovation in the context of digital transformation and South Africa. More research on this topic can help companies to make better decisions about the knowledge acquisition strategies they adopt in pursuit of digital transformation.

1.4 Research objectives

The objectives of this research were:

a) To analyse the various knowledge acquisition strategies that South African banks employ as part of their digital transformation.

b) To determine the extent to which these strategies impact the digital maturity of South African banks.

c) To integrate the internal and external learning perspectives to evaluate the effectiveness of the learning processes of South African banks.

1.5 Rationale

Collectively, South African financial institutions are investing billions into ‘future-fit’ or ‘future-ready’ or digital transformation programmes to remain competitive and thrive in the technological area, and this study aimed to establish a measurable relationship between investment into knowledge acquisition and the outcomes of digital transformation. International studies on the impact of external knowledge acquisition on the outcomes of transformation and/or innovation

abound; however, few studies explore in combination how external knowledge acquisition and internal knowledge development learning strategies work together to improve innovation outcomes (Sancho-Zamora & Hernández-Perlines, 2022). In addition, it has not been possible to find a study with similar characteristics in the South African context. The current study used absorptive capacity to determine the extent to which internal capabilities moderate the impact of knowledge acquisition on the outcomes of innovation. This knowledge can help organisations to determine possible areas for improvement if investment in knowledge acquisition is not achieving the intended outcomes.

1.6 Delimitations of the study

- The study focused on locally controlled banks in South Africa, excluding locally controlled banks in liquidation, branches of foreign banks, foreign bank representatives, foreign-controlled banks and mutual banks.
- The research considered traditional and digital-born banks.
- The respondents were junior, middle, senior and executive-level business, and technology professionals in traditional and digital-born banks.

1.7 Definition of terms

Table 1.2 provides definitions for the terms used in this study.

Table 1.2: Definition of terms

Term	Definition
Organisational learning	Organisational learning is about the individuals of an organisation obtaining knowledge for the purpose of institutionalisation so that the organisations can either adapt to changes in the external environment or change completely as a result Castaneda & Rios (2007).
Digital transformation	Vial (2019, p. 112) defines digital transformation as the "process that aims to improve an entity by triggering significant changes to its properties through combinations of information, computing, communication, and connectivity technologies."
Digital maturity	Digital maturity is a gradual process of integration and implementation of organisational processes, human, and other resources into digital processes and vice versa. To achieve the maximum level of digital maturity companies rely on a digitalisation strategy, the availability of infrastructure and resources and most importantly the willingness, skills and competencies of staff (Aslanova & Kulichkina, 2020).
Knowledge acquisition	Knowledge acquisition is the processes of acquiring, transferring, creating, sharing, and reusing knowledge Souad,(2015).
Absorptive capacity	Absorptive capacity is the ability of a firm to recognise, assimilate and commercialise the value of external knowledge Zahra & George(2002).
Potential absorptive capacity	Potential absorptive capacity reflects the ability of the organisation to acquire and assimilate external knowledge Shaker & George (2002).

Realised absorptive capacity	Realised absorptive capacity reflects the ability of the organisation to leverage new knowledge Zahra & George(2002).

1.8 Assumptions

The study relied on the following assumptions:

- Firstly, success with internal upskilling and reskilling or internal knowledge development initiatives results in higher internal product and process technology acquisition levels.
- Secondly, activities to acquire knowledge through external third parties or external knowledge acquisition result in higher levels of external product and process technology acquisition.
- Thirdly, due to the size of traditional banks, respondents classify their organisations as modern or traditional based on their perception of their work environment. Traditional organisations that employ two-speed transformation strategies may have more modern areas than others.

1.9 Chapter outline

Chapter 1 presents the purpose of the study, the context of the research, the research problem, the research objectives, the significance of the study and the delimitations. The chapter also defines the terms used in the report and discusses the assumptions made regarding the study.

Chapter 2 reviews absorptive capacity (ACAP) as the theoretical framework, as well as prior studies relating to the concepts of organisational learning, digital transformation and digital maturity.

Chapter 3 details the research approach pertaining to the research design, data collection methods, population, sample and research instrument. The data collection procedure, data analysis methods and quality assurance methods are also outlined.

Chapter 4 presents the research findings from the data analysis.

Chapter 5 discusses the research findings for each hypothesis against prior literature to substantiate the findings.

Chapter 6 concludes the research by integrating the findings and objectives, and recommendations are made for possible future research.

CHAPTER 2. LITERATURE REVIEW

2.1 Introduction

The pace and extent of technological development have led to a change in the knowledge environment from being relatively stable in the pre-digital era to turbulent in the digital era. This turbulent knowledge environment is especially challenging for traditional organisations with existing business models, processes, practices and structures based on legacy or pre-digital era knowledge and expertise. These organisations operated with relative success in the pre-digital environment when the external knowledge environment was predictable, stable and closely related to the organisation's internal knowledge levels.

To examine the influence of learning on digital maturity, a literature review on the constructs of organisational learning, digital transformation, digital maturity and ACAP was undertaken. In addition, existing literature was reviewed to examine the knowledge acquisition strategies employed by organisations in response to the turbulent knowledge environment created by technological advancement and the moderating effect of ACAP on the ability of knowledge acquisition strategies to impact digital maturity. The literature review concludes by introducing a conceptual framework to guide the research and demonstrate the relatedness of the constructs examined in the study.

2.2 Background discussion

2.2.1 *Organisational learning*

Organisational learning is about the individuals of an organisation obtaining knowledge for the purpose of institutionalisation so that the organisations can either adapt to changes in the external environment or change completely as a result (Castaneda & Rios, 2007). In 1997, Argyris (1977) defined single-loop and double-loop learning as modes of learning that describe the extent of the organisational response to changes in the knowledge environment. Single-loop learning is evident when the organisation responds to a change in the environment without changing its existing norms and structures. Conversely, double-loop learning entails responding to change by changing existing norms and structures. Single-loop and double-loop learning are not different in value; the value and priority of the type of learning process depend on the prevailing needs of the knowledge environment Wijnhoven (2001).

Since Argyris (1977), organisational learning theory has been expanded on, and the most notable contribution has been by March (1991), who added the exploitation and exploration theories of organisational learning. March (1991, p.85) defined exploitation as “the essence of exploitation is the refinement and extension of existing competencies”, whereas exploration “is about experimenting with new alternatives”. Organisations choose to invest in one at the expense of the other, and these trade-offs are based on cost, benefit and ecological interaction (March, 1991). Mary Crossan(1999) developed the 4I framework that presents organisational learning as four processes (intuiting,

interpreting, integration and institutionalising) that occur over three levels (individual, group and organisation).

Knowledge creation, retention and transfer are the key processes of organisational learning.Argote(2011) further distinguished between knowledge created from within the experience of an organisation as "*knowledge creation*" (p7*)* and knowledge created from experience external to the organisation as "*knowledge transfer*" (p9*)*. Therefore, knowledge creation occurs when individuals within the organisation acquire new knowledge. Conversely, knowledge transfer occurs when the organisation learns from the experience of external parties. Both strategies of knowledge acquisition are an important part of organisational learning.

2.2.1 *Digital transformation*

Vial (2019, p.112) emphasized the multi-disciplinary nature of digital transformation and defines digital transformation as a "process that aims to improve an entity by triggering significant changes to its properties through combinations of information, computing, communication, and connectivity technologies". Digital transformation is a multi-disciplinary theme that encompasses changes in strategy, people, process, technology, culture, and social and organisational structures to generate new pathways for value creation.

The Vial (2019) framework positions that digital transformation leads to changes in value creation paths because of digital technologies. These changes are part

of the strategic response of the organisation and are enabled by changes to the organisational structure, culture, leadership and employee roles and skills.

2.2.2 *Digital transformation and organisational learning*

As technology-driven disruption moves traditional organisations from stable to relatively unstable knowledge environments, there is renewed focus on organisational learning (Leavitt, 2011), and organisations need learning that will produce and sustain discontinuous change in response to the demands for new strategies and assets (Harrison, 2000).

Sousa(2019) describe the impact of digital as having “transformed organizations and this change has brought about circumstances in which many organisations struggle to cope”. Technologies like distributed ledger, robotic process automation, artificial intelligence, the Internet of things, and virtual and augmented reality are changing the technological basis of many industries, thereby destroying the competence of many pre-digital organisations.

Organisational learning is concerned with environment adaption, knowledge acquisition and transformation in response to changes in the external environment. Digital transformation programmes include strategies that enable the organisation to adapt to the changing external environment. As technology disruption moves traditional organisations from stable to relatively unstable knowledge environments, there is a renewed focus on organisational learning.

Therefore, as a result of digital transformation, organisations are asked to learn, and organisational learning must take place because when new strategies, products, resources, or other assets are urgently needed, a different kind of learning is required (Leavitt, 2011).

2.2.3 *Digital maturity*

To understand the outcomes of digital transformation programmes, it is important to clarify digital maturity and how it fits with the various 'digital' terminology. Verhoef et al. (2021, p.890) define digital technology and digital competition and digital customer behaviour as the "external drivers of digital transformation" and digitisation and digitalisation as "phases of digital transformation". Digital maturity occurs because of digital transformation, reflects the status of an organisation's digital transformation journey (Chanias & Hess, 2016) and describes what an organisation has achieved as a result of transformation efforts (Teichert, 2019). Therefore, at higher levels of digital maturity, organisations will be more adept at their digital transformation programmes, and as digital transformation effect changes to organisational structure, culture, leadership and workforce skills, it will continuously improve the organisation's digital maturity.

2.3 Theoretical framework: Absorptive capacity

Cohen and Levinthal's seminal research study on ACAP described ACAP the ability of the firm to identify the value of new information, assimilate it and exploit it for commercial gains Cohen(1990). In their model, Cohen(1990) defined four constructs of ACAP as a) recognition of prior value, b) assimilation, c) exploitation

and d) regimes of appropriability. Extant research on the topic by others has mostly associated ACAP with the ability of an organisation to innovate, and manage technology and technological advancements (Lane et al., 2006).

Zahra(2002) reconceptualised ACAP as a dynamic capability that consists of potential absorptive capacity (PACAP) and realised absorptive capacity (RACAP), where PACAP comprises the constructs of knowledge acquisition and assimilation capabilities, and RACAP involves the constructs' knowledge transformation and exploitation (Zahra & George, 2002). In their model in Figure 2.1, Zahra and George (2002) displaced Cohen and Levinthal's (1990) constructs of recognition of prior value and regimes of appropriability and argued that the four constructs influence organisations' ability to both *create* and *deploy* the knowledge that is required to realise value for the organisation Zahra & George, (2002).

Gergana Todorova(2007) reconceptualised the ACAP construct and introduced a refined model that, amongst other changes, reintroduced the recognition of the value construct and an alternative understanding of transformation. (Gergana Todorova, 2007) argued that transformation is an alternative process; therefore, the clear distinction between PACAP and RACAP, as proposed by Zahra and George (2002), does not hold in Todorova and Durisin's (2007) refined model. By offering an alternative process path for transformation, the model introduced by Gergana Todorova(2007), can be applied in more contexts than the model proposed by Zahra and George (2002), and it can be inferred that the latter will be more appropriate for use in contexts that need to differentiate between PACAP and RACAP. The differentiation suggests that knowledge must be embedded

within the organisation through organisational learning processes before it can be leveraged to achieve innovation or other outcomes. Therefore, as suggested by Zahra and George (2002), the distinction between PACAP and RACAP can be used to explain success levels with knowledge management because it allows for the differentiation of various stages of knowledge management.

Digital transformation expands beyond the acquisition and the subsequent implementation of new technologies and the organisations' ability to learn can moderate the relationship between knowledge acquisition and digital transformation Schuchmann & Seufert(2015). This ability to learn is represented by ACAP.

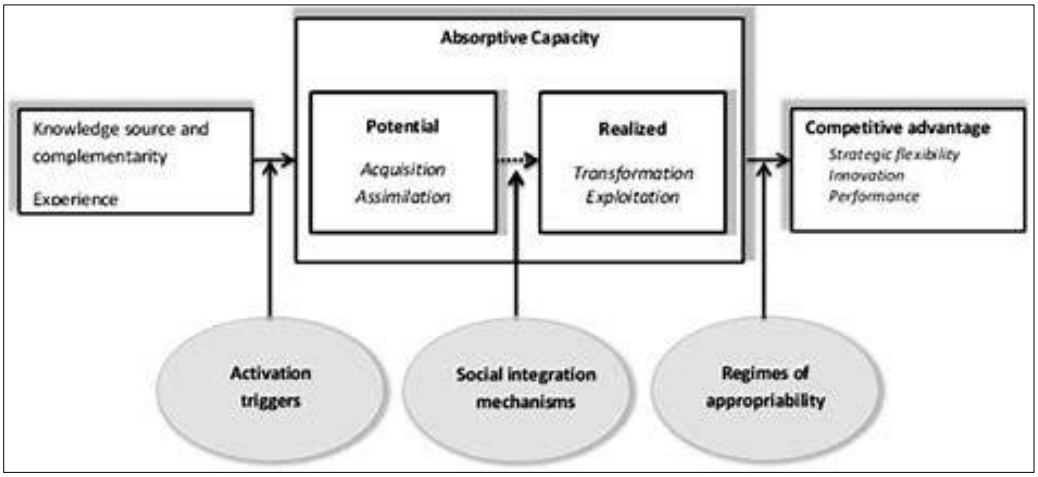

Figure 2.1: Zahra and George's model of absorptive capacity (2002, p.192)

2.4 Knowledge acquisition strategies in response to digital transformation

In the current era of rapid technological change, organisations that learn faster and use knowledge more effectively tend to be leaders (Castaneda et al., 2018). Organisations attempt to acquire new knowledge through either internal

knowledge development, external knowledge acquisition or a combination of the two approaches. Internal knowledge development refers to the efforts of organisations to acquire digital knowledge by investing in the upskilling and reskilling of their internal workforces. Conversely, external knowledge acquisition strategies refer to learning through third parties like alliance partners, digital mergers and acquisitions, partnerships with governments and or universities, and the use of consultants.

2.4.1 *Internal knowledge development*

The digital era is changing the employee skills that organisations need to succeed and requires organisations to update their workforce's skills to remain successful (Ostmeier & Strobel, 2022). Extant literature about internal knowledge development focuses on (i) the impact of digital on existing workforces; (ii) the type of digital skills required to retrain workforces like artificial intelligence, nanotechnology, robotisation, the Internet of things and augmented reality; (iii) using digital to encourage learning, like using artificial intelligence to curate personalised learning content (Sousa & 2019); (iv) formal versus informal training, delivery of training through non-traditional and asynchronous channels like Massive Open Online Course (Dirk Ifenthaler et al., 2021); and (v) the behavioural and cognitive factors that influence employee self-directed or proactive skills development (Ostmeier & 2022). Literature on the why, what and how of internal knowledge development dominates the focus of extant literature; however, there is scant literature on the impact of internal knowledge development activities on the outcomes of digital transformation or other

comparable business variables. Therefore, this study examined the influence of internal knowledge development on digital maturity.

2.4.2 *Hypothesis 1*

H0: Internal knowledge development does not positively influence digital maturity.

H1: Internal knowledge development positively influences digital maturity.

2.4.3 *External knowledge acquisition*

External knowledge acquisition takes place when organisations enter into third-party agreements by hiring consultants, collaborating with strategic partners or alliances, through joint ventures with academia or government and through digital mergers and acquisitions for the purpose of simultaneous product or process development and knowledge transfer.

The pace of change in the technology environment is rapid. Because traditional organisations are large and complex, it is not easy to acquire and exploit new knowledge as readily as it becomes available. To stave off the existential threat of technology and exploit it for product and process innovation, it is useful for traditional organisations to rely on external knowledge acquisition when it is too soon for them to rely on their internal knowledge development capacity. External knowledge acquisition allows traditional organisations to achieve the benefits of modernisation faster and with less cost and greater flexibility (Dyer(1998) and quicken the speed of innovation by gaining access to resources that they do not have (Muthusamy & White, 2005).

In addition to the time, cost and quality efficiencies associated with external knowledge acquisition, the effective alliance should facilitate the dissemination of knowledge among the partners, enabling knowledge-seekers to acquire the knowledge they lack (Siachou et al., 2021).

Siachou et al. (2021) found that alliance knowledge positively impacts the digital transformation of traditional organisations, and ACAP moderates the impact of alliance knowledge on digital transformation outcomes. At higher levels of ACAP, alliance knowledge significantly impacted digital transformation, and conversely, the impact was less significant at lower levels of ACAP. Hanelt et al. (2021) examined the phenomena of digital mergers and acquisitions in the automotive industry, and their study found that digital mergers and acquisitions can help industrial-age organisations build digital knowledge bases. Digital knowledge bases positively influence innovation, and digital mergers and acquisitions directly affect the outcomes of digital innovation. In addition, the study indicated that digital mergers and acquisitions drive knowledge creation in industrial-age organisations; therefore, it can be inferred that digital mergers and acquisitions positively impact internal knowledge development.

2.4.4 *Hypothesis 2*

H0: External knowledge acquisition does not positively influence digital maturity.

H2: External knowledge acquisition positively influences digital maturity.

2.5 The extent to which identified knowledge acquisition strategies impact digital maturity

The ability of knowledge to impact organisations' digital maturity depends on the ability of the organisation to develop capabilities that will sense, attract and successfully implement knowledge to create value for the organisation before it becomes obsolete. ACAP has been linked to the outcomes of innovation or transformation either directly (Zahra & George, 2002; He et al., 2020), indirectly (Siachou et al., 2021) or both (Sancho-Zamora et al., 2022). At high levels of ACAP, organisations can better identify, acquire and implement the right external knowledge. In addition, higher levels of ACAP make it easier for organisations to identify opportunities, generate new knowledge and foster interorganisational relationships that can both add value to existing and lead to new offerings (Jansen, 2005). Conversely, organisations with lower levels of ACAP are less successful with the knowledge acquisition and implementation process (Zahra & George, 2002), and the heterogeneity of the ACAP levels determines the benefits organisations are able to derive from the newly acquired knowledge (Siachou et al., 2021), which can explain why organisations with the same input achieve different outcomes. Therefore, the ACAP of the organisation should positively impact the knowledge acquisition initiatives of an organisation, which leads to hypotheses 3a and 3b.

2.5.1 *Hypothesis 3a*

H0: RACAP does not positively moderate the influence of internal knowledge development on digital maturity.

H3a: RACAP positively moderates the influence of internal knowledge development on digital maturity.

2.5.2 *Hypothesis 3b*

H0: RACAP does not positively moderate the influence of external knowledge acquisition on digital maturity.

H3b: RACAP positively moderates the influence of external knowledge acquisition on digital maturity.

2.6 Integrating the internal and external learning perspectives to evaluate the effectiveness of the learning process of South African banks.

PACAP plays an important role in renewing a firm's knowledge base and skills because it facilitates acquiring and assimilating external knowledge (Zahra & George, 2002). Zahra and George (2002) further distinguished between the endogenous and exogenous nature of PACAP and RACAP, describing PACAP as an interface between the organisation and its external environment. Conversely, RACAP works from within the organisation. PACAP is stronger if the organisation has some prior knowledge, making it easier to acquire and assimilate external knowledge Silvio Popadiuk(2018). Fosfuri (2008) reported that PACAP is a source of competitive advantage that facilitates the efficient transfer of knowledge acquired externally.

The internal and external knowledge acquisition activities of the organisations should create the prior knowledge that make the acquisition and assimilation

capabilities of the organisation more efficient, which leads to hypotheses 4a and 4b.

2.6.1 *Hypothesis 4a*

H0: Internal knowledge development does not positively impact PACAP.

H4a: Internal knowledge development positively impacts PACAP.

2.6.2 *Hypothesis 4b*

H0: External knowledge acquisition does not positively impact PACAP.

H4b: External knowledge development positively impacts PACAP.

2.7 Conceptual framework

Figure 2.2 shows the hypothesised relationships between the study's independent and dependent variables. This framework guided the type of data collected and the analysis of the data.

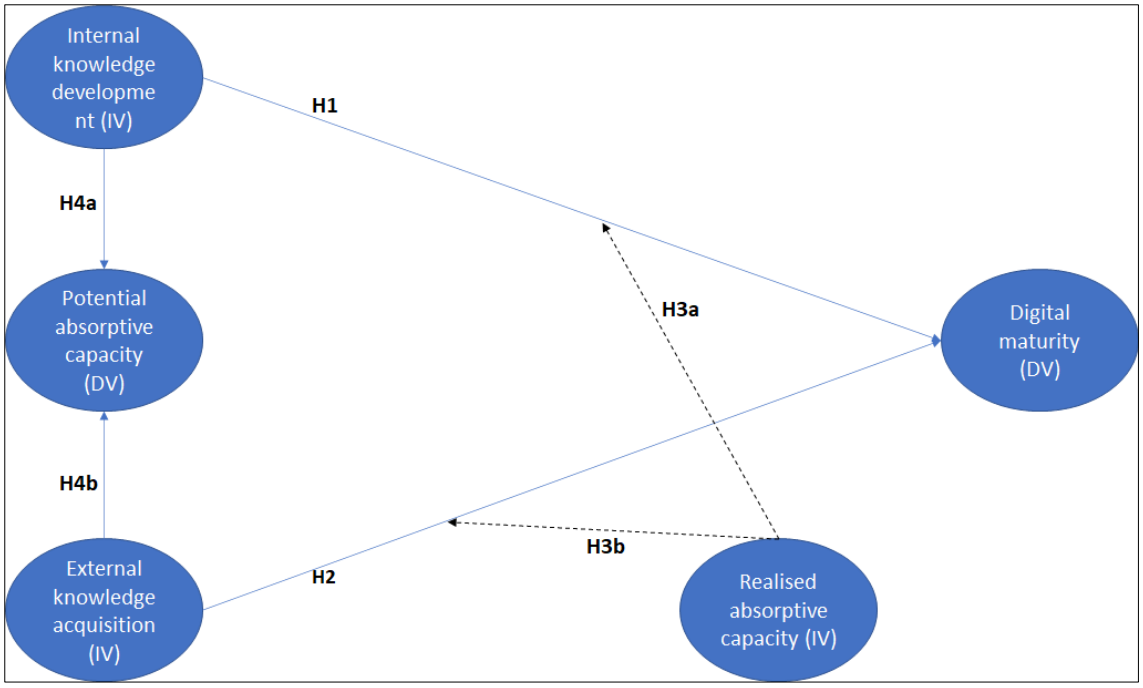

Figure 2.2: The study's conceptual framework

DV: dependant variable; IV: independent variable

2.8 Conclusion

The pace of technological disruption makes it difficult for organisations to transform by themselves; therefore, both internal knowledge development and external knowledge acquisition are important for the digital transformation of organisations. However, knowledge acquisition on its own does not enable organisations to benefit from new knowledge, and organisations require capabilities to assimilate, acquire, transform and exploit new knowledge. ACAP describes the aforementioned capabilities and the ability of organisations to

benefit from knowledge acquisition depends on the levels of ACAP within the organisation. ACAP consists of an external interface, PACAP and an internal interface, RACAP. PACAP represents the assimilation and acquisition capabilities of ACAP, and RACAP represents the transformation and exploitation capabilities of ACAP.

To determine the success of organisational learning as a result of digital transformation, the study examined the influence of knowledge acquisition on digital maturity, the ability of RACAP to moderate the influence of knowledge acquisition and the impact of knowledge acquisition on PACAP. The resultant hypotheses of the study are:

- H1: Internal knowledge development positively influences digital maturity.
- H2: External knowledge acquisition positively influences digital maturity.
- H3a: RACAP positively moderates the influence of internal knowledge development on digital maturity.
- H3b: RACAP positively moderates the influence of external knowledge acquisition on digital maturity.
- H4a: Internal knowledge development positively impacts PACAP.
- H4b: External knowledge development positively impacts PACAP.

CHAPTER 3. RESEARCH METHODOLOGY

This chapter outlines the research methodology used to test the study's hypotheses. It explains the research approach, design and the research instrument used for data collection. The chapter concludes with a discussion of the study's quality control mechanisms.

3.1 Research approach

The study followed a quantitative approach that is appropriate for a) analysing hypotheses as opposed to exploring propositions and b) analysing the causal or correlational relationship between dependent and independent variables. Sancho-Zamora and Hernández-Perlines (2022) successfully used the quantitative approach to analyse the impact of ACAP on innovation and the mediating role of organisational learning.

3.2 Research design

This was a cross-sectional analytical study based on deductive reasoning. A survey questionnaire was used to collect primary data to examine the hypotheses that were arrived at as a result of the literature review. The survey targeted staff of locally controlled South African banks. Due to the targeted sample size, a survey questionnaire was suitable because it is easy to administer to a larger sample, and using statistical analysis tools made data analysis more efficient. However, quantitative analysis relies on large amounts of data for greater statistical power and low response rates would influence the statistical significance of the data. Another disadvantage of using a quantitative research

design is the inability to have context about the feedback from respondents. The feedback was numerical, with little to no insights into the respondents' thoughts and feelings.

3.3 Data collection methods

A survey questionnaire was designed using the Qualtrics tool. This survey was used to collect data from the staff of the banks that had approved them to be surveyed. Banks were approached for approval to survey their staff before the survey was distributed. The survey was made available to respondents via an anonymous link using email, Microsoft Teams and the LinkedIn platform. The survey responses were captured on the Qualtrics platform and exported to a comma-separated values file for further analysis. In Microsoft Excel, the text-based output was converted to numerical values for the Likert scale data:

Strongly disagree = 5; Somewhat disagree = 4; Neither disagree or agree = 3; Somewhat agree = 2; Strongly agree = 1.

The converted comma-separated values file was uploaded to SmartPLS 4 for statistical data analysis.

3.4 Population and sample

3.4.1 *Population*

The locally controlled South African banks that were asked for approval were Absa Bank, African Bank, Capitec Bank, FirstRand (First National Bank and Rand

Merchant Bank), Nedbank, Standard Bank, Tyme Bank and Discovery Bank. The survey was distributed to employees of banks that provided approval.

3.4.2 *Sample*

The participant/variable ratio method was used to determine the sample size and 15 respondents per variable, as proposed by Hair et al. (2005), was used to determine the study's population. The study has five within-scope variables; therefore, the target population was 75.

This method was selected because it was difficult to predict how many banks would approve for their staff to be surveyed and if they would have any restrictions w.r.t how many staff can be approached. The study targeted junior, middle, senior and executive staff of locally controlled banks.

A total of 55 responses were collected of which 48 was used for analysis after incomplete and invalid responses were removed from the sample.

The small sample size inhibits the generalisability of the study to other contexts and/or industries.

3.4.3 *Sampling method*

Due to ethical considerations on-random sampling was used to identify the respondents. They were chosen using a) convenience: including members within the researcher's professional network; snowballing: including members within the networks of the researcher's professional network and c) purposive sampling: inviting specific individuals on professional network platforms.

3.5 The research instrument

Qualtrics was used to host and design the online survey. Likert scales were used so that the data could be converted from nominal to ordinal for data analysis. The operationalisation of the survey instrument can be found in Appendix A and the Microsoft Word format of the survey is in Appendix C.

The layout of the survey flow was:

- **Respondent information**
    - The questions identified if the respondent works for a locally controlled South African bank because only responses from staff of locally controlled banks were analysed. Further, it captured the respondent's job level and role orientation.
- **Company information**
    - The questions identified the respondent's perception of the type of organisation or department within the organisation that they work for.
- **Internal knowledge development**
    - The questions were adapted from Jones et al. (2001), using internal process and product technology acquisition as the factors to operationalise internal knowledge development.
- **External knowledge development**
    - The questions were adapted from Jones et al. (2001), using external process and product technology acquisition to operationalise external knowledge development.
- **PACAP**
    - The questions were adapted from Jansen (2005), using acquisition and assimilation to operationalise PACAP.

- **RACAP**
    - The questions were adapted from Jansen (2005), using transformation and exploitation to operationalise PACAP.

3.6 Procedure for data collection

A Qualtrics survey link was sent to potential respondents using email and professional network platforms like LinkedIn. The study's variables were converted to 5-point Likert scales to convert the nominal data to ordinal data.

3.7 Data analysis strategies and interpretation

The data were analysed using the Partial Least Square Structural Equation Modelling regression analysis technique and the SmartPLS 4 software (Ringle et al., 2022). This was a suitable technique for this study because it is predictive, allowing for the observation of causal relationships; it is suitable for both small and large samples; it is flexible and does not require data to follow a normal distribution; and it is a non-parametric method and recommended to use for ordinal data like Likert scales (Hair et al., 2019; Sancho-Zamora et al., 2022). Studies with similar characteristics that have successfully used the data analysis technique and tools include the study by Sancho-Zamora et al. (2022) who used Partial Least Square Structural Equation Modelling to determine the direct impact and mediated impact of ACAP on innovation. The structural equation model is divided into two sub-models: measurement and structural.

The measurement model represents the relationships between observed data and latent variables, and the goal of the measurement model assessment is to

ensure that the construct indicators are reliable and valid enough to be included in the path model. Indicator reliability, internal consistency reliability (Cronbach's alpha, reliability coefficient (rhoA), and composite reliability (rhoC)), convergent validity and discriminant were used to evaluate the measurement model.

The prescribed assessment procedure was:

- Step 1 – Assess indicator reliability
- Step 2 – Assess internal consistency reliability
- Step 3 – Assess the convergent validity
- Step 4 – Assess the discriminant validity (Hair et al., 2021b, p.91)

Table 3.1 shows the criteria used along with the thresholds for each criterion. The thresholds represent the acceptable range for the criteria to be suitable.

Table 3.1: Criteria and their thresholds

Criteria	Thresholds applied in the study
Indicator loadings	≥ 0,300
Internal consistency reliability	• Cronbach's alpha as the lower bound > 0,60 • Composite reliability rhoC > 0,60 • The reliability coefficient internal consistency reliability rhoA > 0,60
Convergent validity	Average variance extracted ≥ 0,50
Discriminant validity	Heterotrait-monotrait ratio <0,90

The structural model represents the relationships between the latent variables and is focused on evaluating the significance and relevance of the path coefficients (Hair et al., 2021a). The prescribed assessment procedure was:

- Step 1 – Assess collinearity issues
- Step 2 – Assess the significance of relevance of construct relationships
- Step 3 – Assess the model's explanatory power
- Step 4 – Assess the model's predictive power
- Step 5 (optional) – Model comparisons (Hair et al., 2021a, p.133)

Steps 4 and 5 are not applicable to this research.

Table 3.2 shows the criteria that were used to assess the structural model, along with the thresholds for each criterion. The thresholds represent the cut-off or range for the criteria to be suitable.

Table 3.2: Structural model criteria and their thresholds

Criteria	Thresholds applied in the study
Collinearity	Variance inflation factor ≥ 5
Significance and relevance of the path coefficients	Significance of path coefficient (t-value) > 1,96 Magnitude of path coefficient (p-value) < 0,05 f2 values for each path and check that they follow the same rank order as the path coefficient magnitude
R-square value	>0,10

3.8 Possible limitations and challenges of the study

- Not all banks responded to the request for approval to survey their staff.
- It was challenging to get feedback from respondents from the banks that had approved for their staff to be surveyed and the minimum sample size was not achieved.

3.9 Quality assurance

3.9.1 *External validity*

- The study was weak in external validity due to the use of the purposive sample selection method and due to the small sample size.
- Purposive sampling selects participants possessing characteristics required by the study. therefore, the results of this study may only be generalised to that sub-population. This study selected participants who work for locally controlled South-African banks and who are junior , middle or senior managers or executives

3.9.2 *Internal validity*

- To maximise internal validity, ensuring that the survey measured what it intended to measure, the same survey was provided to all participants, and respondents were asked if they work for a local South African Bank.

3.9.3 *Reliability*

- The survey instrument was adapted from survey instruments used in past studies, ensuring that the questions were appropriate to measure the constructs.

3.10 Ethical considerations

- The research was subject to ethics clearance by the ethics board of The University of the Witwatersrand, and the study proceeded once ethics clearance was obtained (Appendix D).
- Survey respondents were informed of the study's purpose (Appendix B), and they had the option to choose to proceed to participate.
- Research permission was requested from all banks and not all banks responded to the request for permission.
- Only staff of banks that provided permission were surveyed.
- The survey instrument was updated to so that participating banks cannot be identified directly or by inference.
- The approval letters/contracts from banks were not included in this document so that participating banks cannot be identified directly or by inference.
- The identity of the respondents and their associated organisations were anonymised and not identifiable to the researcher from the raw data

CHAPTER 4. PRESENTATION OF RESULTS

4.1 Introduction

The results are based on the survey made available to the staff of South African banks that approved their staff to be surveyed. For each hypothesis, the assessments of the measurement, structural model and hypothesis outcome are presented.

4.2 Demographic profile of respondents

The survey was sent to respondents of consenting banks. Five local banks approved their staff to be surveyed. Other locally controlled banks did not respond to the request for approval. Of the 55 respondents that completed the survey, four abandoned part-way, Figure 4.1.

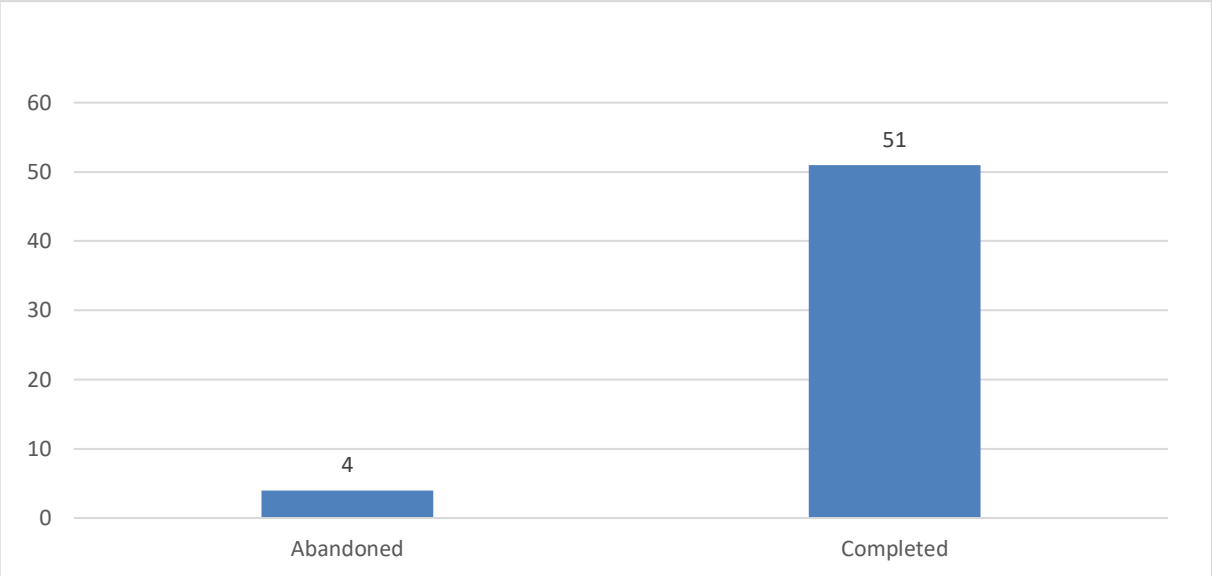

Figure 4.1: The study's respondents who completed the survey or abandoned part-way

Three responses were discarded as the respondents indicated that they do not work for a locally controlled South African bank; thus, 48 responses were used for data analysis (Table 4.1).

Table 4.1: Demographic profile: Role level

Q2: Describe your role level	Total count (All)	48	100%
	Junior Manager	4	8,3%
	Middle Manager	10	20,8%
	Senior Manager	29	60,4%
	Executive	5	10,4%

Table 4.1 indicates that most participants are senior managers, followed by middle managers.

Table 4.2: Demographic profile: Role orientation

Q3: Describe your role orientation	Total count (All)	48	100%
	Primarily technology-focused	36	75%
	Primarily non-technology focused	12	25%

Table 4.2 indicates that most participants are employed in primarily technology-focused roles.

Table 4.3: Demographic profile: Organisation description

Q15: Please select the set of statements that in your opinion mostly describe your organisation	Total count (All)	48	100%
	A. Modern core written in modern programming languages. Lean and Agile. Culture of built-in house. Customer-centric. Faster innovation at lower cost. Streamlined environment. Modern, transparent.	16	33,3%
	B. Applications built over decades with complexity. Asset Heavy. Product-centric. Slower innovation at high cost. Vertical integration. Legacy, Complex.	32	66,7%

Table 4.3 indicates that most respondents classified their organisations as Type B (Applications built over decades with complexity. Asset Heavy. Product-centric. Slower innovation at high cost. Vertical integration. Legacy, Complex).

Type B is characteristic of traditional South African banks; however, within these large organisations, some departments may be more experienced with newer technologies than others, therefore a Type A organisation could refer to a more modern department within a traditional organisation.

4.3 Measurement model assessment of the conceptual construct

The measurement model assessment determined the reliability and validity of the conceptual model construct that the study introduced in Chapter 2 (Figure 2, page 23).

4.3.1 *Indicator reliability outer loading factors*

The variables with factor loading between 0,30 and 0,70 are acceptable, and those variables greater than 0,70 are highly satisfactory. It is recommended that variables (Q7_1, Q7_2) with factor loadings less than 0,30 should be deleted (Table 4.4). However, Q7_1, Q7_2 and Q7_3 represent the Acquire dimension of PACAP, and a construct needs to have at least three factors so that it can be explained.

Table 4.4: Measurement model assessment: Outer loadings

Variables	Outer loadings
Q10_1 <- RACAP	0,703
Q10_2 <- RACAP	0,711
Q10_3 <- RACAP	0,722
Q11_1 <- Digital maturity	0,673
Q11_2 <- Digital maturity	0,743
Q11_3 <- Digital maturity	0,741
Q12_1 <- Digital maturity	0,661
Q12_2 <- Digital maturity	0,665
Q13_1 <- Digital maturity	0,587
Q13_2 <- Digital maturity	0,649
Q13_3 <- Digital maturity	0,670
Q13_4 <- Digital maturity	0,581
Q14_1 <- Digital maturity	0,676
Q14_2 <- Digital maturity	0,632
Q14_3 <- Digital maturity	0,652
Q15_1 <- Digital maturity	0,700
Q15_2 <- Digital maturity	0,490
Q15_3 <- Digital maturity	0,386
Q15_4 <- Digital maturity	0,549
Q16_1 <- Digital maturity	0,592
Q16_2 <- Digital maturity	0,535
Q16_3 <- Digital maturity	0,596
Q16_4 <- Digital maturity	0,475
Q5_1 <- Internal knowledge	0,927
Q5_2 <- Internal knowledge	0,870
Q5_3 <- Internal knowledge	0,859
Q6_1 <- External knowledge	0,891
Q6_2 <- External knowledge	0,935
Q6_3 <- External knowledge	0,837
Q7_1 <- PACAP	0,215
Q7_2 <- PACAP	0,060
Q7_3 <- PACAP	0,335
Q8_1 <- PACAP	0,856
Q8_2 <- PACAP	0,827
Q8_3 <- PACAP	0,918
Q9_1 <- RACAP	0,631
Q9_2 <- RACAP	0,652
Q9_3 <- RACAP	0,766
Q9_4 <- RACAP	0,666
RACAP x Internal knowledge -> RACAP x Internal knowledge	1,000
RACAP x External knowledge -> RACAP x External knowledge	1,000

4.3.2 *Internal consistency reliability*

The result for composite reliability is presented in Table 4.5. The results reveal that the composite reliability of the constructs is above the 0,60 satisfactory level, indicating a high level of internal consistency among the reflective constructs. The digital maturity construct has composite reliability results above 0,90, indicating almost perfect estimated reliability.

The average variance extracted for digital maturity, RACAP and PACAP is lower than the prescribed minimum of 0,50; however, because the composite reliability is higher than 0,60, the convergent validity of the construct is still adequate (Fornell & Larcker, 1981).

Table 4.5: Measurement model assessment: Composite reliability

	Cronbach's alpha	Reliability coefficient (rhoA)	Composite reliability (rhoC)	Average variance extracted
Digital maturity	0,914	0,919	0,924	0,383
External knowledge	0,866	0,881	0,918	0,790
Internal knowledge	0,863	0,871	0,916	0,785
PACAP	0,736	0,729	0,742	0,404
RACAP	0,820	0,827	0,867	0,482

PACAP: potential absorptive capacity; RACAP: realised absorptive capacity

4.4 Structural model assessment of the conceptual construct

R-square and R-square adjusted was used to evaluate the explanatory power of the conceptual construct.

4.4.1 *R-square adjusted*

The R-square adjusted value indicates that the model can explain 64,7% of the variability for digital maturity, 2,2% of the variability for external knowledge acquisition and 8% of the variability for PACAP (Table 4.6). Falk and Miller (1992) recommend that R-square adjusted values be greater than or equal to 0,10 for the variance of a construct to be considered adequate. Therefore, the model's explanatory power for digital maturity is very strong but not adequate for external knowledge acquisition and PACAP because the data reveal a weak correlation between the dependent and independent variables (Chin & Marcoulides,1998).

Table 4.6: Structural model assessment: R-square and R-square adjusted

	R-square	R-square adjusted
Digital maturity	0,685	0,647
External knowledge acquisition	0,042	0,022
PACAP	0,099	0,080

PACAP: potential absorptive capacity

4.5 Hypothesis 1

4.5.1 *Structural model assessment of hypothesis 1*

H0: Internal knowledge development does not influence digital maturity.

H1: Internal knowledge development positively influences digital maturity.

The outcomes of the structural model assessment are presented in Table 4.7, and the data reveal that:

- The path coefficient is negative (-0,071).
- The f-square effect is small at 0,008% (Cohen, 1988).

- The heterotrait-monotrait ratio is below the suggested threshold of 0,90, indicating that discriminant validity has been established between the constructs.
- No multi-collinearity exists because the variance inflation factor is lower than the 2,5 cut-off.

Table 4.7: Structural model assessment of hypothesis 1

	Path coefficients	f-square	Heterotrait-monotrait ratio	VIF
Internal knowledge development -> digital maturity	-0,071			
Internal knowledge development -> digital maturity		0,008		
Internal knowledge development <-> digital maturity			0,311	
Internal knowledge development <-> digital maturity				1,875

VIF: variance inflation factor

4.5.2 *Hypothesis testing of hypothesis 1*

Table 4.8 shows that the t-value is less than 1,96 (0,542) and the p-value is more than 0,05 (0,588); therefore, H0 cannot be rejected.

Table 4.8: Hypothesis testing of hypothesis 1

	Original sample	Sample mean	Standard deviation	T-statistics*	p-value
Internal knowledge development -> digital maturity	-0,071	0,469	0,226	0,542	0,588

*(|original sample/standard deviation|)

4.6 Hypothesis 2

H0: External knowledge acquisition does not positively influence digital maturity.

H2: External knowledge acquisition positively influences digital maturity.

4.6.1 *Structural model assessment of hypothesis 2*

The outcomes of the structural model assessment are presented in Table 4.9, and the data reveal that:

- The path coefficient is negative (-0,193).
- The f-square effect is small at 0,064% (Cohen, 1988).
- The heterotrait-monotrait ratio is below the suggested threshold of 0,90, indicating that discriminant validity has been established between the constructs.
- No multi-collinearity exists because the variance inflation factor is lower than the 2,5 cut-off.

Table 4.9: Structural model assessment of hypothesis 2

	Path coefficients	f-square	Heterotrait-monotrait ratio	VIF
External knowledge acquisition -> digital maturity	-0,193			
External knowledge acquisition -> digital maturity		0,064		
External knowledge acquisition <-> digital maturity			0,392	
External knowledge acquisition <-> digital maturity				1,847

VIF: variance inflation factor

4.6.2 *Hypothesis testing of hypothesis 2*

Table 4.10 shows that the t-value is less than 1,96 (1,622), and the p-value is more than 0,05 (0,105); therefore, H0 cannot be rejected.

Table 4.10: Hypothesis testing of hypothesis 2

	Original sample	Sample mean	Standard deviation	T-statistics*	p-value
External knowledge acquisition -> Digital maturity	-0,411	-0,505	0,151	1,622	0,105

*(|original sample/standard deviation|)

4.7 Hypothesis 3a

H0: RACAP does not positively moderate the influence of internal knowledge development on digital maturity.

H3a: RACAP positively moderates the influence of internal knowledge development on digital maturity.

4.7.1 *Structural model assessment of Hypothesis 3a*

The outcomes of the structural model assessment are presented in Table 4.11, and the data reveal that:

- The path coefficient is negative (-0,071).
- The f-square effect is medium at 0,101% (Cohen, 1988).
- The heterotrait-monotrait ratio is below the suggested threshold of 0,90, indicating that discriminant validity has been established between the constructs.
- No multi-collinearity exists because the variance inflation factor is lower than the 2,5 cut-off.

Table 4.11: Structural model assessment of hypothesis 3a

	Path coefficients	f-square	Heterotrait-monotrait ratio	VIF
RACAP x internal knowledge -> digital maturity	-0,071			
RACAP x internal knowledge -> digital maturity		0,101		
RACAP x internal knowledge -> digital maturity			0,348	
RACAP x internal knowledge -> digital maturity				1,982

RACAP: realised absorptive capacity; VIF: variance inflation factor

4.7.2 *Hypothesis testing of hypothesis 3a*

Table 4.12 shows that the t-value is more than 1,96 (1,977), and the p-value is less than 0,05 (0,049); therefore, H0 is rejected.

Table 4.12: Hypothesis testing of hypothesis 3a

	Original sample	Sample mean	Standard deviation	T-statistics*	p-value
RACAP x internal knowledge development -> digital maturity	-0,070	-0,052	0,074	1,977	0,049

RACAP: realised absorptive capacity; *(|original sample/standard deviation|)

4.8 Hypothesis 3b

H0: RACAP does not positively moderate the influence of external knowledge acquisition on digital maturity.

H3b: RACAP positively moderates the influence of external knowledge acquisition on digital maturity.

4.8.1 *Structural model assessment of hypothesis 3b*

The outcomes of the structural model assessment are presented in Table 4.13, and the data reveal that:

- The path coefficient is negative (-0,245).
- The f-square effect is medium at 0,114% (Cohen, 1988).
- The heterotrait-monotrait ratio is below the suggested threshold of 0.90, indicating that discriminant validity has been established between the constructs.
- No multi-collinearity exists because the variance inflation factor is just lower than the 2,5 cut-off at 2,025.

Table 4.13: Structural model assessment of hypothesis 3b

	Path coefficients	f-square	Heterotrait-monotrait ratio (HTMT)	VIF
RACAP x external knowledge -> digital maturity	-0,245			
RACAP x external knowledge -> digital maturity		0,114		
RACAP x external knowledge -> digital maturity			0,323	
RACAP x external knowledge -> digital maturity				2,025

RACAP: realised absorptive capacity; VIF: variance inflation factor

4.8.2 *Hypothesis testing of hypothesis 3b*

Table 4.14 shows that the t-value is more than 1,96 (2,442), and p-value is more than 0,05 (0,015); therefore, H0 is rejected.

Table 4.14: Hypothesis testing of hypothesis 3b

	Original sample	Sample mean	Standard deviation	T-statistics*	p-value
RACAP x External knowledge acquisition -> Digital maturity	-0,076	-0,080	0,060	2,442	0,015

RACAP: realised absorptive capacity; *(|original sample/standard deviation|)

4.9 Hypothesis 4a

H0: Internal knowledge development does not positively impact PACAP.

H4a: Internal knowledge development positively impacts PACAP.

4.9.1 *Structural model assessment of Hypothesis 4a*

The outcomes of the structural model assessment are presented in Table 4.15, and the data reveal that:

- The path coefficient is positive (0,315).
- The f-square effect is medium at 0,110 (Cohen, 1988).
- The heterotrait-monotrait ratio is below the suggested threshold of 0,90, indicating that discriminant validity has been established between the constructs.
- No multi-collinearity exists because the variance inflation factor is lower than the 2,5 cut-off.

Table 4.15: Structural model assessment of hypothesis 4a

	Path coefficients	f-square	Heterotrait-monotrait ratio	VIF
Internal knowledge -> PACAP	0,315			
Internal knowledge -> PACAP		0,110		
Internal knowledge -> PACAP			0,322	
Internal knowledge -> PACAP				1,000

PACAP: potential absorptive capacity; VIF: variance inflation factor

4.9.2 *Hypothesis testing of hypothesis 4a*

Table 4.16 shows that the t-value is less than 1,96 (1,154) and p-value is more than 0,05 (0,249); therefore, H0 cannot be rejected.

Table 4.16: Hypothesis testing of hypothesis 4a

	Original sample	Sample mean	Standard deviation	T- statistics*	p-value
PACAP x external knowledge acquisition -> digital maturity	-0,076	-0,080	0,060	1,154	0,249

PACAP: potential absorptive capacity; *(|original sample/standard deviation|)

4.10 Hypothesis 4b

H0: External knowledge acquisition does not positively impact PACAP.

H4b: External knowledge development positively impacts PACAP.

4.10.1 *Structural model assessment of hypothesis 4b*

The outcomes of the structural model assessment are presented in Table 4.17, and the data reveal that:

- The path coefficient is negative (-0,026).
- The f-square effect is small at 0,044 (Cohen, 1988).
- The heterotrait-monotrait ratio is below the suggested threshold of 0,90, indicating that discriminant validity has been established between the constructs.
- No multi-collinearity exists because the variance inflation factor is lower than the 2,5 cut-off.

Table 4.17: Structural model assessment of hypothesis 4b

	Path coefficients	f-square	Heterotrait-monotrait ratio	VIF
PACAP -> external knowledge	-0,026			
PACAP -> external knowledge		0,044		
PACAP-> external knowledge			0,236	
PACAP -> external knowledge				1,000

PACAP: potential absorptive capacity

4.10.2 *Hypothesis testing of hypothesis 4b*

Table 4.18 shows that the t-value is less than 1,96 (0,732), and the p-value is more than 0,05 (0,464); therefore, H0 cannot be rejected.

Table 4.18: Hypothesis testing of hypothesis 4b

	Original sample	Sample mean	Standard deviation	T-statistics*	p-value
PACAP -> external knowledge	-0,076	-0,080	0,060	0,732	0,464

PACAP: potential absorptive capacity; *(|original sample/standard deviation|)

4.11 Summary of the results

Chapter 4 presented in detail the results from the data analysis that included the measurement and structural models. The measurement model established the validity of the construct, and the structural model established the significance of the hypothesised relationships. The measurement model assessment revealed

that two factor loadings were below the 0,300 threshold, but the study did not delete the factors because they were important to keep the Acquire dimension of the PACAP construct measurable. The internal validity scores of the constructs (Cronbach's alpha, rhoA and rhoC) were above the recommended threshold of 0,60, but the average variance extracted for digital maturity, PACAP and RACAP was below the 0,50 threshold; however, this is acceptable because the composite reliability scores of these constructs are above 0,60.

The proposed hypotheses and outcomes were:

- H1: Internal knowledge development positively influences digital maturity.

H1 evaluated if internal knowledge development positively influences digital maturity. The results revealed that internal knowledge development does not ($t = 0.535$; $p = 0.593$) significantly impact digital maturity; therefore, H1 is not supported.

- H2: External knowledge acquisition positively influences digital maturity.

H2 evaluated if external knowledge development positively influences digital maturity. The results revealed that external knowledge development does not significantly impact digital maturity ($t = 1.622$; $p = 0.105$); therefore, H2 is not supported.

- H3a: RACAP positively moderates the influence of internal knowledge development on digital maturity.

H3a evaluated if RACAP positively moderates the influence of internal knowledge development on digital maturity. The results revealed that RACAP does moderate the influence of external knowledge development on digital maturity ($t = 1.977$; $p = 0.049$); however, the path coefficient is negative. Therefore, H3a is partially supported.

- H3b: RACAP positively moderates the influence of external knowledge acquisition on digital maturity.

H3b evaluated if RACAP positively moderates the influence of external knowledge development on digital maturity. The results revealed that RACAP positively moderates the influence of external knowledge development on digital maturity ($t = 2.442$; $p = 0.015$); therefore, H3b is supported.

- H4a: Internal knowledge development positively impacts PACAP.

H4a evaluated if internal knowledge development positively impacts PACAP. The results revealed that internal knowledge development does not positively impact PACAP ($t = 1.154$; $p = 0.249$); therefore, H4a is not supported.

- H4b: External knowledge acquisition positively impacts PACAP.

H4 evaluated if external knowledge development positively impacts PACAP. The results revealed that external knowledge development does not positively impact PACAP ($t = 0.732$; $p = 0.464$); therefore, H4b is not supported.

CHAPTER 5. DISCUSSION OF THE FINDINGS

5.1 Introduction

This chapter discusses the study's results for each hypothesis, using literature to explain the differences and similarities between the hypothesised and actual results.

5.2 Discussion pertaining to hypothesis 1

Hypothesis 1: Internal knowledge development positively influences digital maturity.

The results for hypothesis 1 revealed that internal knowledge development does not influence the bank's digital maturity. Why is this the case? It is counterintuitive that learning does not influence the digital maturity of the respondent banks, especially given their significant financial investment in learning. Individuals obtain knowledge for the purposes of institutionalisation (Castaneda et al., 2018). The survey section that dealt with internal knowledge acquisition assumes that for learning to impact digital maturity, it would have had to be institutionalised to be available for the development of process and product technologies.

The 4I framework can be used to explain the results of hypothesis 1. The four premises that form the basis of the 4I framework by Crossan et al. (1999) are:

a) Premise 1: Organisational learning involves a tension between assimilating new learning (exploration) and using what has been learned (exploitation).

b) Premise 2: Organisational learning occurs over three levels: individual, group and organisation.
c) Premise 3: The three levels of organisational learning are linked by the 4I processes.
d) Premise 4: Organisational learning links cognition and action, leading to cognition-affected action and vice versa action affects cognition.

Table 5.1 tables the four premises with a corresponding explanation of the finding from the data analysis to explain why internal knowledge development does not positively influence digital maturity.

Table 5.1: Evaluating the results of hypothesis 1 using the 4I premises

Premise	Finding
Premise 1	The results indicate that organisations might still be prioritising the exploitation of existing knowledge and that new knowledge due to exploration is not yet available for exploitation.
Premise 2	The results indicate that knowledge acquisition might still only be at individual and organisation level and not yet at group level.
Premise 3	The results indicate that knowledge is not yet institutionalised.
Premise 4	Organisational learning links cognition and action. This differentiates it from the related fields of knowledge management and intellectual capital. The results indicate that what has been and is being learned is not yet been actioned upon.

Using the 4I premises, the study can infer why, despite the significant investment in learning, it is not yet yielding the desired influence on the digital maturity of the respondent banks. The reasons for this phenomenon could be that i) banks are acquiring knowledge faster than they can exploit the knowledge (in literature, the phenomena whereby organisations do not have sufficient capacity to implement new knowledge has been called bottlenecks (Cohen & Levinthal, 1990) and stockpiling (Crossan et al., 1999); ii) the respondent banks are still more invested in exploitation at the expense of exploration (Huber, 1991). New knowledge is

inhibited from feeding forwards, and, as a result, the gap between what the organisation needs to do and what it has learned to do remains significant (Crossan et al., 1999).

5.3 Discussion pertaining to hypothesis 2

Hypothesis 2: External knowledge acquisition positively influences digital maturity.

External knowledge acquisition allows traditional organisations to apply the benefits of exploration alongside their current exploitation activities. Siachou et al. (2021) positioned that traditional organisations cannot transform independently because they lack sufficient knowledge about new technologies. Additionally, they can avoid digital transformation missteps by strategising with alliance partners. However, the results from the data analysis contradict literature that external knowledge acquisition positively impacts business variables like innovation (Hanelt et al., 2021), either directly (Hanelt et al., 2021) or indirectly (Siachou et al., 2021). Like the evaluation of hypothesis 1, I use the four premises of the 4I framework to explain the results of hypothesis 2 or why external knowledge acquisition does not have the desired influence on the digital maturity of the respondent banks (Table 5.2).

Table 5.2: Evaluating the results of hypothesis 2 using the 4I premises

Premise	Finding
Premise 1	Knowledge transfer from the third-party is not yet institutionalised at the organisation level; therefore. it is not seen to be contributing to the perceived digital maturity of the traditional organisation.
Premise 2	The results indicate that knowledge acquisition might still only be at individual and organisation level and not yet at group level.
Premise 3	The knowledge from third parties is not yet institutionalised.
Premise 4	The results indicate that what has been and is being learned is not yet been actioned upon.

Evangelia Siachou (2021) and Sousa(2019) positioned that a direct relationship between knowledge acquisition through alliance partners cannot be supported unquestionably. The relationship can fail to achieve the desired impact on digital maturity through knowledge transfer as a result of (i) competitive learning and knowledge transfer processes; (ii) conflict of interest that might arise when the alliance partners use the partnership to learn about the business and technologies of the other for own gain. Muthusamy & White(2005) and Siachou et al. (2021) found that strategic interdependence between alliance partners is a prerequisite for traditional organisations to benefit from the knowledge of the

alliance partner and that mutual strategic interdependence would minimise the risks associated with the knowledge gap between the alliance partners. When strategic interdependence is asymmetrical, the partnership's gains will be tactical and of low impact on digital transformation. When strategic interdependence is symmetrical, the gains from partnerships are more likely to influence digital transformation for the traditional organisation.

5.4 Discussion pertaining to hypotheses 3a and 3b

Hypothesis 3a: RACAP positively moderates the influence of internal knowledge development on digital maturity.

Hypothesis 3b: RACAP positively moderates the influence of external knowledge acquisition on digital maturity.

From the perspective of organisational learning, ACAP limits the rate or quantity of scientific or technological information and knowledge that an organisation can effectively and productively internalise and use (Silvio Popadiuk, 2018); Oxford Review, 2022). Greater ACAP provides a greater capability to acquire and exploit external information (Greis et al., 2001). Therefore, it can be inferred that RACAP, encompassing the transformation and exploitation dimensions of ACAP, should strengthen the effect of knowledge acquisition on digital maturity. The results of hypotheses 3a and 3b reveal that the effect of moderation on internal knowledge development and external knowledge acquisition, respectively, is different.

The RACAP results for external knowledge acquisition are congruent with literature (Hanelt et al., 2021) that absorptive capacity positively moderates the

influence of external knowledge acquisition on business variables. The path coefficient for the moderated influence of external knowledge acquisition on digital maturity is -0,193; without the moderating effect of RACAP, the path coefficient increases to -0,214. Therefore, it can be inferred that at higher levels of RACAP, the negative patch coefficient will continue to decrease until it becomes positive.

However, the path coefficient for the moderated impact of internal knowledge development on digital maturity is -0.071; without the moderating effect of RACAP, the path coefficient is -0.037. Therefore, as the moderator, RACAP negatively impacts the ability of internal knowledge development to influence digital maturity. Existing literature have reported positive results about the ability of ACAP to achieve positive outcomes on various business variables like innovation and performance, both directly or indirectly (mediating or moderating) and only a few studies have reported findings to the contrary. Backmann(2015) found an inverted-U shape relationship between ACAP and the performance of new product development and opined that there may be diminishing returns to investments in learning. However, diminishing returns only set in after initial gains have been achieved. Therefore, it is inappropriate to use the law of diminishing returns to explain the findings of this study. Following on from the inferences drawn from the results of hypothesis 1, that internal knowledge is not yet institutionalised and therefore not available to influence digital maturity, it might be plausible that existing levels of RACAP are based on existing ‘old’ new knowledge, which has not yet been combined with ‘new’ knowledge. Therefore, current transformation and exploitation capabilities are more capable of exploiting

old knowledge than new knowledge; however, this would contradict the results of hypothesis 3a.

Considering the research design, how the study operationalised the constructs could have measured different contexts of the constructs, where the internal knowledge development construct focused on the exploitation of new knowledge and the RACAP construct captured information about existing capabilities. Therefore, as RACAP (based on old transformation and exploitation) increases, the influence of internal knowledge development on digital maturity decreases because the exploitation of the old continues at the expense of exploration and institutionalisation of the new. This phenomenon was described by Crossan et al. (1999), who positioned that organisational learning reveals a tension between exploration (feed-forward) and exploitation (feedback). The tension between assimilating new learning (feed-forward) and using what has already been learned (feedback) arises because the old, institutionalised knowledge constrains the assimilation of new learning. Fully assimilating new learning requires the feed-forward of learning from the individual and group to become institutionalised in the organisation. This challenge for organisations is to ensure that exploitation does not drive out exploration.

5.5 Discussion pertaining to hypothesis 4a and 4b

Hypothesis 4a: Internal knowledge development positively impacts PACAP.

Hypothesis 4b: External knowledge acquisition positively impacts PACAP.

The results reveal that the path coefficients for hypotheses 4a and 4b are not statistically significant and that internal knowledge development and external information acquisition do not impact PACAP. Prior knowledge is assumed to be created by internal knowledge development and external knowledge acquisition. According to Zahra and George (2002) and Cohen and Levinthal (1990), prior knowledge in a given domain is the most important predictor of ACAP in that area. The findings contradict research that PACAP is stronger if the organisation has some prior knowledge (Silvio Popadiuk, 2018), assuming that internal knowledge development and external knowledge acquisition would impact PACAP, but the findings do agree with literature that internal information flows must be efficient for PACAP to gain from knowledge acquisition (Fosfuri, 2008).

The findings of hypotheses 4a and 4b support the findings of hypotheses 1 and 2. As a result, if knowledge acquisition, due to internal knowledge development and external knowledge acquisition, is not institutionalised and available at the organisational level, it cannot influence digital maturity (hypotheses 1 and 2), and it is not available as prior knowledge that can positively impact PACAP (hypotheses 4a and 4b).

5.6 Discussion pertaining to the conceptual framework.

Based on the study's findings, the proposed conceptual framework can be revised as illustrated in Figure 2.3 to reflect the below outcomes:

- Internal knowledge and external knowledge development both require institutionalisation before it can be exploited therefore it can be combined in the conceptual framework to enhance simplicity.
- The study did not produce significant results to justify the need for differentiation of RACAP and PACAP as proposed by Zahra and George (2002), therefore in the revised framework the ACAP framework proposed by Todorva and Durisin (2007) can be considered. The Todorova and Durisin (2007) framework does not differentiate between RACAP and PACAP.

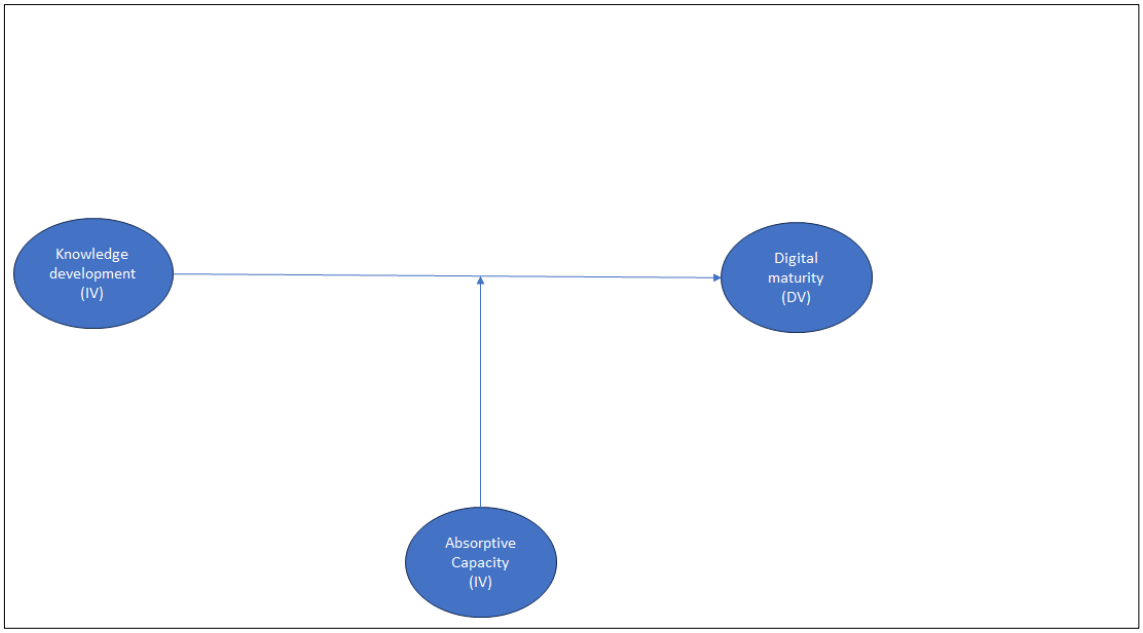

Figure 5.1 Revised Conceptual framework

5.7 Conclusion

This chapter integrated the study's findings and the literature studied in Chapter 2 and determined if the hypotheses' results agreed, partially agreed, or disagreed with the literature.

According to existing literature, knowledge must be institutionalised at the organisational level before it may impact business variables. As a result, hypotheses 1 and 2 agree with literature in that internal knowledge growth and external knowledge acquisition have limited impact on digital transformation unless they are institutionalised.

The results of hypotheses 3a and 3b showed that RACAP moderates the impact of internal knowledge development and external knowledge acquisition on absorptive capacity, whilst the moderation effect for hypothesis 3a was negative and the moderation effect for hypothesis 3b was positive. As a result, the results of hypothesis 3a fully agree with literature, and the results of 3b partially agree with literature.

The findings for hypotheses 4a and 4b suggested that internal knowledge development and external knowledge acquisition have no significant impact on PACAP, which disagrees with existing literature.

The study's findings led to a revised conceptual framework that integrates the outcomes of the hypothesis.

The following chapter summarises the research by evaluating how the hypotheses' results support the research aims and provides recommendations for further research.

CHAPTER 6. CONCLUSIONS & RECOMMENDATIONS

6.1 Introduction

This chapter integrates the findings of the hypotheses into the original research objectives identified in Chapter 1, responding to each objective in turn.

6.2 Conclusions regarding research objective 1

The purpose of research objective 1 was to analyse the various knowledge acquisition strategies that organisations employ as part of their digital transformation. The results found that organisations invest in both internal and external knowledge acquisition, and the demographic information revealed that internal knowledge development is more associated with a modern organisational perspective and that external knowledge acquisition is more associated with a traditional organisational perspective.

The study used the extent to which internal product and process technology influence digital maturity to indicate the success of internal upskilling and reskilling efforts. Hypothesis 1 found that internal knowledge development does not significantly impact digital maturity; therefore, existing investments in upskilling and reskilling have not yet had desired digital maturity impact.

The results for external knowledge acquisition were the same. Although institutions are investing in external knowledge acquisition, the knowledge

acquired has not been institutionalised (hypotheses 2 and 3b); therefore, it is not yet available to influence organisations' digital maturity.

The results showed that whilst organisations are investing in internal and external knowledge acquisition, their capabilities to feed-forward this new knowledge so that it moves from individual to group and from interpret to institutionalise is either non-existent or not strong enough. The study highlights the complexity of organisational learning as a multi-dimensional process different from knowledge management. More specifically, it highlights that organisations cannot benefit from investments in acquiring knowledge until the new knowledge is combined with existing knowledge and is ready to be exploited.

6.3 Conclusions regarding research objective 2

The purpose of research objective 2 was to determine the extent to which these strategies impact the digital maturity of South African banks.

The results from hypotheses 3a and 3b indicated that both internal knowledge development and external knowledge acquisition do not have a statistically significant influence on the digital maturity of the participating South African banks. Using the premises of the 4I framework to explain the results, the following conclusions were drawn: 1) internal and external knowledge had not been institutionalised so that it can influence the digital maturity of the participants from South African banks. The results supplement extant literature on the impact of knowledge acquisition on various business variables and strategic renewal programmes by focusing on organisational learning as a process that facilitates learning.

6.4 Conclusions regarding research objective 3

The purpose of research objective 3 was to integrate internal and external learning perspectives to evaluate the effectiveness of South African banks' learning processes.

The study integrated the internal and external learning perspective with the PACAP and RACAP constructs of ACAP to evaluate the effectiveness of learning processes. PACAP acts as the interface between the organisation and the external environment. High levels of PACAP indicate that the organisation has sufficient prior knowledge of the new knowledge environment and is, therefore, better able to sense and attract the knowledge that the organisation needs. Therefore, effective learning processes result in the availability of prior knowledge due to knowledge exploitation. The results from hypotheses 4a and 4b revealed that internal knowledge development and external knowledge acquisition do not influence PACAP because the knowledge has not yet been institutionalised so that it is available as prior knowledge. The findings from hypotheses 1, 2, 4a and 4b indicate that the learning processes of the participant banks have not effectively supported the digital maturity ambitions of the participant banks. In addition, extant literature that distinguishes between the PACAP and RACAP constructs indicates that PACAP positively impacts RACAP; however, results of the current study reveal the inverse; RACAP is a prerequisite for PACAP. As a result, this finding suggests that the ACAP framework of Todorova and Durisin (2007) may be more appropriate because it posits that assimilation and transformation are alternative and not sequential processes, capturing the impact

of time, whereas Zahra and George's (2002) framework relies on sequence to distinguish acquire, assimilate, transform and exploit.

6.5 Recommendations

The study indicates that it is insufficient for organisations to only invest in upskilling and reskilling without developing the capabilities for that knowledge to become institutionalised. Similarly, where organisations are investing in external knowledge acquisition, as is frequently the case with the adoption of two-speed strategies for digital transformation, in the absence of the right capabilities, third-party knowledge does not change the organisation's knowledge base, or it changes too slowly, therefore impacting the pace of digital transformation and digital maturity as a result.

The results also indicated that the knowledge transfer process is time-sensitive, and it is important to assess where an organisation is and what it needs to adjust from a knowledge acquisition perspective. Practically, this means that knowledge bottlenecks may occur occasionally, which should be expected due to the big change in the external knowledge environment. The results indicate that it is more important to know when there is a knowledge block than to try to prevent it from happening at all in the first place.

As a result, it is therefore recommended that organisations develop key performance indicators for knowledge management processes so that the feed-

forward of knowledge is actively managed and appropriate decisions are made when issues are identified.

The results also indicated that organisations might benefit from strengthening or developing their RACAP abilities first to support the feed-forward of information as it moves from individual to group and from interpret to institutionalised.

6.5.1 *Suggestions for further research*

The following areas have been identified for further research:

a) To improve the outcomes of the assessment and structural model analysis, a larger population sample should be applied if the study is repeated at the industry level.
b) The operationalisation of the construct can also be improved to ensure that the variables are assessed within the same context and measure what they intend to measure.
c) Based on the conclusion of research objective 3, it would be useful to repeat the study using Todorova and Durisin's (2007) ACAP framework, where PACAP and RACAP are not treated as distinct processes, and importantly assimilation and transformation are alternative processes.
d) The diminishing returns of ACAP is an interesting field for further study.
e) With the improvements above, the study could be applied to individual organisations to examine the success of their knowledge acquisition strategies.
f) Research on organisational learning in the South African context should continue to gain sufficient literature that can be used to support organisations'

decisions regarding learning. This is important given the country's social skills and economic disparity; there is a need to ensure the employability of the citizens, as well as the economic viability of organisations.

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APPENDIX A: Consistency matrix

Table A1: Operationalisation of variables

Variable	Definition of variable	Indicator	Category of data	Measure	Reference
Internal knowledge development	Extend that internal knowledge is used for product and process development.	a) Internal product and process technology acquisition	Ordinal	5-point Likert scale	Adapted from: Jones et al., 2001
External knowledge development	Acquiring product and process knowledge through 3rd parties.	a) External product and process technology acquisition	Ordinal	5-point Likert scale	Adapted from Jones et al., 2001
Digital maturity	Ability to deliver the digital strategy and digital transformation objectives.	a) Strategic Capability b) Leadership Capability c) Market Capability d) Operational Capability e) Cultural Capability f) Governance Capability g) Technology Capability	Ordinal	5-point Likert scale	Adapted from Rossmann, 2019
PACAP acquisition	Ability to identify and acquire external knowledge.	a) External interactions b) Informal collection of industry trends (talks, lunches) c) Periodic meetings with clients, suppliers	Ordinal	5-point Likert scale	Adapted from Jansen, 2005
PACAP assimilation	Ability to understand external knowledge through internal routines.	a) Adopt new opportunities b) Recognise market shifts c) Analyse and Interpret market demands	Ordinal	5-point Likert scale	Adapted from Jansen, 2005

RACAP transformation	The internalisation and conversion of the new knowledge acquired.	d) Sharing practical experiences e) Recognising usefulness of new knowledge to existing knowledge	Ordinal	5-point Likert scale	Adapted from Jansen, 2005
RACAP exploitation	Development of routines to consistently apply new knowledge for the creation of new goods and services.	a) Common product and service language b) Implementation of new products and services	Ordinal	5-point Likert scale	Adapted from Jansen, 2005

APPENDIX B: Participant information sheet

Dear Participant, I am a Master of Management student at the University of Witwatersrand Business School studying Digital Business. As part of my degree requirements, I must complete a research project.

My research project examines the influence of organisational learning on the digital maturity of South African banks. The study will examine the efficacy of the learning strategies used by South African banks in response to the digital-led knowledge environment. Your contribution to the project will significantly improve the final report.

The web-based questionnaire should take no more than 10 minutes to complete. Your participation is voluntary and will not be remunerated. Your response is completely confidential and anonymous.

Thank you for taking the time to complete the questionnaire. Should you wish to obtain more information, you are welcome to contact me, my supervisor or the university as per the information provided below.

By completing this survey, you are consenting to participating in the study.

Kind Regards Angelique Benjamin
Student email: 2397585@students.wits.ac.za
Contact number: 0725977012

Supervisor: Dr Manessah Alagbaoso
Supervisor email: Manessah.Alagbaoso@standardbank.co.za

APPENDIX C: Survey

The influence of organisational learning on the digital maturity of South African banks.

Survey Flow

Standard: Block 7 (1 Question)
Standard: Respondent information (3 Questions)
Standard: Company information (1 Question)
Standard: Internal product and process technology acquisition (1 Question)
Standard: External product and process technology acquisition (1 Question)
Standard: Potential Absorptive Capacity (2 Questions)
Standard: Realised absorptive capacity (RACAP) (2 Questions)
Standard: Digital Maturity (6 Questions)

End of Block: Block 7

Start of Block: Respondent information

Q1 **Do you work for a locally controlled (South African) bank ?**

- ○ Yes (1)
- ○ No (2)

Q2 **Describe your role level**

- ○ Junior Manager (1)
- ○ Middle Manager (2)
- ○ Senior Manager (3)
- ○ Executive (4)

Q3 **Describe your role orientation**

- ○ Primarily technology focused (1)
- ○ Primarily non-technology focused (2)

End of Block: Respondent information

Start of Block: Company information

Q15 **Please select the set of statements that in your opinion mostly describe your organisation.**

- ○ A. Modern core written in modern programming languages. Lean and Agile. Culture of built-in house. Customer-centric. Faster innovation at lower cost. Streamlined environment. Modern, transparent. (1)
- ○ B. Applications built over decades with complexity. Asset Heavy. . Product-centric. Slower innovation at high cost. Vertical integration. Legacy, Complex. (2)

End of Block: Company information

Start of Block: Internal product and process technology acquisition

Q5 **Internal product and process technology acquisition.**

	Strongly disagree (1)	Somewhat disagree (2)	Neither agree nor disagree (3)	Somewhat agree (4)	Strongly agree (5)
We develop the product and process technology we requires through our own research. (1)	○	○	○	○	○
We spend more resources on developing our own product and process technology than on buying it from other companies. (2)	○	○	○	○	○
Our products are based primarily on product and process technology we developed. (3)	○	○	○	○	○

End of Block: Internal product and process technology acquisition

Start of Block: External product and process technology acquisition

Q6 **External product and process technology acquisition**

	Strongly disagree (1)	Somewhat disagree (2)	Neither agree nor disagree (3)	Somewhat agree (4)	Strongly agree (5)
We acquire a majority of our product and process technology from related third-party companies. (1)	○	○	○	○	○
We are heavily dependent on other companies to supply us with new product and process technology. (2)	○	○	○	○	○
We rely on external sources to provide us with new generations of the product and process technology we use. (3)	○	○	○	○	○

End of Block: External product and process technology acquisition

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Start of Block: Potential Absorptive Capacity

Q7 Potential Absorptive Capacity: Knowledge Acquisition

	Strongly disagree (11)	Somewhat disagree (12)	Neither agree nor disagree (13)	Somewhat agree (14)	Strongly agree (15)
We have frequent external interactions to acquire new knowledge. (1)	○	○	○	○	○
We collect industry information through informal means (lunch with industry friends, talks with trade partners). (2)	○	○	○	○	○
We periodically schedule special meetings with clients to acquire new knowledge. (3)	○	○	○	○	○

Q8 **Potential Absorptive Capacity: Knowledge Assimilation**

	Strongly disagree (1)	Somewhat disagree (2)	Neither agree nor disagree (3)	Somewhat agree (4)	Strongly agree (5)
We quickly recognise shifts in our market (e.g., competition, regulation, demography). (1)	○	○	○	○	○
New opportunities to serve our clients are quickly understood. (2)	○	○	○	○	○
We quickly analyse and interpret changing market conditions. (3)	○	○	○	○	○

End of Block: Potential Absorptive Capacity

Start of Block: Realised absorptive capacity (RACAP)

Q9 **Realised Absorptive Capacity: Knowledge Transformation**

	Strongly disagree (1)	Somewhat disagree (2)	Neither agree nor disagree (3)	Somewhat agree (4)	Strongly agree (5)
Our unit regularly considers the consequences of changing market demands in terms of products and services. (1)	○	○	○	○	○
Employees record and store newly acquired knowledge for future reference. (2)	○	○	○	○	○
We quickly recognise the usefulness of new external knowledge for future reference. (3)	○	○	○	○	○
Employees share practical experiences. (4)	○	○	○	○	○

Q10 **Realised Absorptive Capacity: Knowledge Exploitation**

	Strongly disagree (1)	Somewhat disagree (2)	Neither agree nor disagree (3)	Somewhat agree (4)	Strongly agree (5)
We implement new products and services with relative ease. (1)	○	○	○	○	○
Employees have a common language regarding our products and services. (2)	○	○	○	○	○
New knowledge increased the competitiveness of our organisation. (3)	○	○	○	○	○

End of Block: Realised absorptive capacity (RACAP)

Start of Block: Digital Maturity

Digital Maturity: Strategic Capability

	Strongly disagree (1)	Somewhat disagree (2)	Neither agree nor disagree (3)	Somewhat agree (4)	Strongly agree (5)
The digital strategy of our firm has a significant influence on existing business and operating models. (1)	○	○	○	○	○
The digital strategy is being continuously evaluated and adapted. (2)	○	○	○	○	○
The digital strategy of our firm is documented and communicated. (3)	○	○	○	○	○

Q12 **Digital Maturity: Leadership Capability**

	Strongly disagree (1)	Somewhat disagree (2)	Neither agree nor disagree (3)	Somewhat agree (4)	Strongly agree (5)
Our executives support the implementation of the digital strategy. (1)	○	○	○	○	○
The digital strategy of our firm has an influence on the task and role profiles of executives. (2)	○	○	○	○	○

Q13 **Digital Maturity: Market Capability**

	Strongly disagree (1)	Somewhat disagree (2)	Neither agree nor disagree (3)	Somewhat agree (4)	Strongly agree (5)
Digital products and services are embedded in our business interfaces and business processes. (1)	○	○	○	○	○
Digital products and services create a perceptible impact on customer experience. (2)	○	○	○	○	○
There is a direct added value created by the progressive digitisation of products and services of our firm (e.g., cost reductions, increased productivity, better customer experience, customer differentiation). (3)	○	○	○	○	○
Digital products and services have a large impact on the overall performance of our firm. (4)	○	○	○	○	○
Our firm is creating significant sales volume via digital channels. (5)	○	○	○	○	○

Q14 **Digital Maturity: Technology Capability**

	Strongly disagree (1)	Somewhat disagree (2)	Neither agree nor disagree (3)	Somewhat agree (4)	Strongly agree (5)
Our firm uses large amounts of data to optimise strategies, processes and products. (1)	○	○	○	○	○
Within our firm, we use tools for digital modelling, automation and control of business processes. (2)	○	○	○	○	○
Digital technologies are the mainspring for the further development of products and services. (3)	○	○	○	○	○

Q15 **Digital Maturity: People and Expertise Capability**

	Strongly disagree (1)	Somewhat disagree (2)	Neither agree nor disagree (3)	Somewhat agree (4)	Strongly agree (5)
Within our firm, there are sufficient experts on digital core issues. (1)	○	○	○	○	○
Within our firm, further education opportunities for digital core topics are available. (2)	○	○	○	○	○
Within our firm, comprehensive measures to strengthen digital literacy development are implemented. (3)	○	○	○	○	○
Within our firm, new job profiles have been created for employees with expertise in core digital topics. (4)	○	○	○	○	○

Q16 **Digital Maturity: Cultural Capability**

	Strongly disagree (1)	Somewhat disagree (2)	Neither agree nor disagree (3)	Somewhat agree (4)	Strongly agree (5)
Decisions within our firm are transparent to our own employees. (1)	○	○	○	○	○
Digitisation has an impact on the decision-making agility of our firm. (2)	○	○	○	○	○
In day-to-day business, employees and executives exchange information about the digital transformation of our firm. (3)	○	○	○	○	○
Continuous change is part of our corporate culture. (4)	○	○	○	○	○

End of Block: Digital Maturity

APPENDIX D: Ethics approval

Graduate School of Business Administration
University of the Witwatersrand, Johannesburg

Wits Business School

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

Ethics Clearance Certificate

Ethics protocol number: WBS/DB2397585/635
This certificate is only valid with a legitimate ethics protocol number and signed by the Researcher (below).

This certificate is only valid if accompanied by formal permission from the relevant stakeholder(s).

Project title	The influence of organisational learning on the digital maturity of South African banks
Investigator / Researcher	Ms Angelique Benjamin
Nature of Project	MM (Digital Business)
Decision of the Committee	Approved, provided stakeholders and participants are guaranteed anonymity and confidentiality.
Issue Date of Certificate	2022-09-02
Expiry date	Date of submission of the project / research 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 and I guarantee to ensure compliance with these conditions. Should any departure to be contemplated from the research procedure as approved I undertake to resubmit the protocol to the Committee.

Signature

2022-09-21
Date:

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