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Relationship between digital transformation and business performance of selected South African banks

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Relationship between Digital Transformation and Business Performance of selected South African banks

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Sculpting global leaders

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

Johannesburg, 2020

ABSTRACT

South African-based banks are committed to succeeding in the never-ending race towards Digital Transformation, driven by the ever-changing needs of customers. During the current time, digital maturity is a key indicator of Digital Transformation, with customer-centric business models, and increased profits amongst the top-trending focus areas of Digital Transformation in banking. The conundrum facing the South African banking industry, is the complexity presented by attempting Digital Transformation during a period when the rate of customer needs and technology change is increasing at an unpredictable pace, compounded by the impact of the Coronavirus disease of 2019 (COVID-19) outbreak.

Digital Transformation remains unchartered territory, and with apparent gaps and flaws existing in current research on Digital Transformation of the South African banking industry.

This study recognizes Digital Transformation as an area that exhibits continuous change, because of the race towards maximum profit-extraction from ever-changing consumer needs and the use of technology is to radically improve the performance or reach of enterprises (Westerman, G., Bonnet, D., and McAfee, A., 2014).

This study addresses gaps in current research on Digital Transformation in the South African Banking industry, using academic research methods, empirical evidence and fundamental data analysis to explore relationships between Digital Transformation and Business Performance of selected South African-based banks. Drawing from existing literature on Digital Transformation and accounting measures of Business Performance, relevant to the Business Performance indicators specified by Westerman, G., et al. (2014), specific to Banking this study focusses on Business Performance indicators that are common across the financial statements published by the South African-based banks who took part in the study, namely: Capital Adequacy ratio (CAR), Cost-to-Income ratio (CTIR),

Credit Loss ratio (CLR), Earnings Before Interest and Tax margin (EBITM), Fixed Asset Turnover ratio (FATR), Net Profit margin (NPM), Revenue per Employee ratio (RER), Return on Assets (RoA), Return on Equity (RoE). The study is based upon the Westerman's Leading Digital Framework (see Appendix - I and Appendix – J) as it features direct evidence of links between Digital maturity and Business Performance, alluding to higher levels of Business Performance and profitability being achieved through the progression of Digital maturity.

The unit of analysis for this exploratory study was the South African Banking industry, the sample within this is the individual Banks.

The exhaustive approach towards statistical analysis presented challenges as the data analysis was performed with only 3 banks taking part in the study, this implies that although there were 29 responses, 14 for Bank A, 5 for Bank B and 10 for bank C, the sample was 3 as the unit of analysis was a bank. This is because CAR, CTIR, CLR, EBITM, FATR, NPM, RER, RoA and RoE, was only per bank and hence the analysis could not be done per survey respondent. On the basis that parametric analysis techniques generally requires a minimum of 30 samples, the study used non-parametric analysis techniques to explore for relationships and correlations.

The analysis revealed that Digital maturity had a relatively weak and an insignificant impact on Business Performance. Thus the outcome of the study suggests that Business Performance as measured by CAR, CTIR, CLR, EBITM, FATR, NPM, RER, RoA and RoE cannot be used as a proxy for Digital Maturity in Banking overall, and further academic research is required to produce conclusive evidence on relationships between Digital Transformation and Business Performance.

KEY WORDS

Digital Transformation
Digital Maturity

DECLARATION

I, John-Paul Okkers, 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: John-Paul Okkers Signature: 

Signed at ……

On the 31st..……..…….. day of …March..…… 2022

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LIST OF ACRONYMS

ABSA	Amalgamated Banks of South Africa
API	Application Programming Interface
FNB	First National Bank
CAR	Capital Adequacy Ratio
COVID-19	Corona Virus Disease 2019
CLR	Credit Loss Ratio
CTIR	Cost To Income Ratio
EBITM	Earnings Before Interest and Tax margin
FATR	Fixed Asset Turnover Ratio
IoT	Internet of Things
IBM	International Business Machines
OECD	Organisation for Economic Co-operation and Development
NPR	Net Profit Margin
RoA	Return on Assets
RoE	Return on Equity
RER	Revenue per Employee Ratio
SMAC	Social, Media, Analytics and Cloud
3D	Three-Dimensional
4IR	Fourth industrial Revolution

1 INTRODUCTION

1.1 Purpose of the study

Current literature on Digital maturity presents a host of similar definitions for Digital Maturity, each accompanied by unique factors and dimensions about Digital maturity. Westerman's Leading Digital Framework (see Appendix - I and Appendix – J) features direct evidence of links between Digital maturity and Business Performance, alluding to higher levels of Business Performance and profitability being achieved through the progression of Digital maturity.

This study is interested in exploring whether this is true and does so through exploring the existence of relationships between Digital Transformation and Business Performance of South African-based banks. The study is based on South African-based banks on the basis of practicality and convenience. Practically, the COVID-19 pandemic had resulted in South African-based Banks expediting the execution of business strategy as well as prioritising the development of customer relationships through Digital engagement. The fundamental justification for selecting the South African Banking industry was due to the existence of limited literature globally with evidence linking Digital Transformation with Business Performance. In addition, the socioeconomic and regulatory factors relevant to South African is different to other industries. To aid the study, the researcher had leveraged an extensive network of contacts and a wealth of work-experience within the South African Banking industry to mobilize and progress the study during the onset of the COVID-19 virus, and the proliferation of online engagements coupled with speedy implementations of Digital Transformation strategies.

1.2 Context of the study

This section provides a background of the South African banking industry, its current state of affairs and various challenges faced by the industry.

Marcum (2014) refers to Digital technology as something that is changing almost every aspect of people's lives and society. Stief, S., Eidhoff, A., and Voeth, M. (2016) share the view that all Banks are faced with an increasing need to evolve and conform to remain competitive. Stief, S., et al. (2016) also alludes to the implementation of Digital Technology as an imperative for businesses looking to improve efficiency, levels of business agility and remain relevant to customers.

In the context of 4IR, the term "Digital" refers to technologies used to achieve a fusion of production systems and smart systems that are seamlessly integrated with other organisational resources. "Digital" technologies under 4IR are generally accepted as being: IoT, Cobots, AI, ML, Big Data, Augmented Reality, 3D and 4D printing. The design of online-banking channels is based primarily on: perceived usefulness, trust, and relative advantages to customers and organisations (Wu, H., Lin, C., Li, H,. 2010).

1.2.1 *Overview of the South African Banking industry*

The South African Banking industry has managed to prosper during trying times (Ernest and Young, 2012:55; Springfield, C., 2015). The industry has also been plagued with pressures such as; uncertain economic outlook, new market entrants, increasing technological innovation, and rising regulatory costs (Ernest and Young, 2012:1; Taylor, J., 2011:2).

During the 2017-2019 period the South African economy proved to be rather resilient, as this period saw Gross Domestic Product (GDP) growth cut from 1.5% to 0.5% (World Bank Group, 2020), high unemployment rates, unstable electricity supply on behalf of the national electricity supplier Eskom, a bailout of Eskom and

other state-owned entities as well as claims of state capture. During this period the South African Banking industry achieved approximately 70% market penetration (Publisher Research Council, 2018). The Banking industry boasts products ranging from insurance, credit, savings and transactional accounts (see Appendix A), and has seeing an influx of customers experimenting with and gravitating towards consumer and retail payment FinTechs firms, which include: Mobile wallets, Peer2Peer mobile systems, foreign exchange and remittances, real-time payments and Digital currency solutions (BNY Mellon, 2015).

Innovation within the South African Banking industry is something which has is driven by ever-changing customer needs and technology advancement.

The impact of the Fourth Industrial Revolution (4IR) has resulted in banks focussing their efforts toward online-banking channels, and this has resulted in an increasing trend towards in branch-closure (BusinessTech, 2020). Online-banking channels have been integrated with social media platforms, such as Facebook (ABSA, 2016), WeChat (MyBroadband, 2015), and WhatsApp (ABSA, 2018). The emergence of Digital Banks has increased the level of competition within the banking industry. Through a collaboration with retail services, Digital Banks are able to provide integrated banking services through an extended network of supermarket chain stores (ITWeb, 2019).

The COVID-19 outbreak resulted in societal change and accelerated the uptake of Digital banking channels. The outbreak also accelerated experimentation with new business models.

1.2.2 *Retail Banking in South Africa*

Retail Banking has always been considered to be a grouping of financial products and services - offered to the general public - that cater for various Banking needs, namely loans and deposits (Das, K., 2009:23; Lin, J., Chang, C., and Jou, R., 2011:252). The South African retail Banking industry consists of a number of

banking groups, inclusive of banking services, comprising; online, physical branches, per telephone or at an offsite Banking kiosk.

1.2.3 *Challenges in the South African Banking industry*

The global Banking industry has been under immense pressure to regain the trust of banking customers since the 2008 global financial crisis, emphasized the gravity of deceptive behaviour by banks and connected parties (Ernest and Young, 2012:6; Springfield, C., 2015). Banking customers have since been empowered through access to information and online communities, and have leveraged social media engagements to elevate brand awareness, compelling the global banking community to relook the approach towards customer loyalty and management of customer relationships (Eckstein, M. 2018).

In addition to global challenges, the South Africa Banking industry has seen significant transformation due to the emergence of innovative payments and lending solutions offered by Financial Technology (FinTechs) firms and Digital banks (McKinsey, 2019).

The South African economy has seen high levels of inflation, aging infrastructure and unemployment, resulting in high costs of living. South African-based bank's have openly reduced banking fees, to prevent cost-sensitive customers from switching to competitor banks (Berndt, A., Herbst, F., and Roux, L., 2004:31; Ernest and Young, 2012:1; Taylor, J., 2011:2). As a result Banking customers have grown accustomed to lower banking fees (BusinessTech, 2016).

As at 2018, South African-based banks reported that between 22% and 80% of banking transactions are performed via Digital banking channels (see Appendix – A), with an increasing preference shown towards the use of Digital banking channels (TechCentral, 2018, and BusinessTech, 2019, FreeFind, 2019, and South Africa National Treasury, 2019). The South African Banking industry is presented with new entrants and technological innovation of banking solutions,

further driving down the cost of Banking services for both banked and unbanked customers (Finnegan, M., 2017). This rapid innovation has startled governance bodies such as the Payments Association of South Africa, whom have shown significant support towards the establishment of the Presidential Commission on the 4IR by the South African government (PASA, 2019).

1.3 Research problem

Current research on Digital Maturity of the South African Banking industry suggests much more is needed to understand how to increase competitive advantage using Digital Transformation and profits, this is the key problem being addressed by the study.

Business Performance is generally assessed through a variation of Business Performance indicators. Business strategy and investment-appetite of shareholders is a key problem for Digital Transformation and is deemed the larger factors at play. These factors cannot be controlled nor overlooked and are due to circumstances of; legacy technologies and the risk-averse South African Banking regulatory framework. These factors are indeed extraneous to the study. The key factor worth noting is business strategies, which has a distinct ability to dictate the journey towards Digital Transformation. Whilst there exists a myriad of way to assess Business Performance through application of accounting measures of Business Performance, the study draws from existing literature and has focused on Business Performance indicators specified by Westerman, G., et al. (2014) and the Business Performance indicators found common and / or similar across the financial statements published by the South African-based banks who participated in the study, namely: CAR, CTIR, CLR, EBITM, FATR, NPM, RER, RoA and RoE.

This study expands on current research, through using facts and empirical evidence to assess the Digital maturity of selected South African-based bank as

well as introduces, to literature, the proposition that accounting measures of Business Performance is a proxy for Digital maturity in banking.

1.4 Research objectives

The main objective of this study is to ascertain if there is a relationship between Digital Transformation and Business Performance. The key focus is on the Digital Transformation of the South African Banking industry. Considering the problem statement presented in section 1.3 above, the study addresses the following objectives:

- RO-1: Whether or not there is a relationship between Digital maturity and accounting measures of Business Performance, namely: CAR, CTIR, CLR, EBITM, FATR, NPM, RER, RoA and RoE.
- RO-2: Whether or not accounting measures of Business Performance is a proxy for Digital maturity in Banking.

1.5 Significance of the study

Banks are unsettled by ever-changing customer expectations and behaviour (Eckstein, M. 2018). Banking customers are seemingly less loyal than ever before, switching between alternative banks and providers of integrated banking services (Ernest and Young, 2012:1; Petzer, D.J., and De Meyer, C.F., 2016:8;). As a result, banks have prioritized innovation towards new value stream creation and new business models, in response to consumer behaviour and growing competition from Digital Banks and FinTechs (Petzer, D.J., and De Meyer, C.F., 2016:8; Taylor, J.,

2011:2).

Banks are complex organisations, faced with the dilemma of being unable to link total value generated through Digital Transformation and Business Performance.

Researchers are not aligned on any standard method of measuring efficiency models, rather it is suggested to select Business Performance indicators based on interest and intended purpose and to accept that Digital Transformation is capable of unlocking operating efficiencies which then result in some form of improved Business performance (Sealey, C., and Lindley, J., 1977; Kaparakis, E., Miller, S., and Noulas, P., 1994; Zaim, 1995). To produce a suitable and wide-ranging view of Business Performance, it is also suggested to consider financial variables such as total assets, total deposits, loans, and gross operating income, as being general enough to identify and signal some indication of improved Business performance that has resulted from Digital Transformation (Fukuyama, T., 1993).

To uncover this dilemma, this study makes use of a quantitative methods model to verify the accomplishments of Digital Transformation at an industry level and to gain additional insights into the impact of Digital Transformation on the Business Performance of selected South African-based banks. This study assesses the Digital maturity of selected South African-based banks, to establish facts and empirical research as a basis for Digital Transformation in the South African banking industry.

In addition, this study makes use of accounting methods to explore for relationships between Digital Maturity and Business Performance indicators, comparing financial ratios associated with liquidity, efficiency, profitability and market value (Ncube, M., 2009), to introduce the proposition that accounting measures of Business Performance is a proxy for Digital maturity in banking. Thus demystifying the relationship between Digital Transformation and Business Performance as well as establishing a basis for benchmarking of Digital Transformation in the South African Baking industry.

The study further dispels the notion that at the current rate of Digital innovations in the South African Banking industry, financial firms are unable to compete with

new Fintech start-ups. The advent of new Fintech start-ups suggests it is an opportune time to find a standard method for comparing Banks and Fintechs.

1.6 Delimitations of the study

The study focuses on Banking, defined as a grouping of financial products and services - offered to the general public - that cater for various banking needs, namely loans and deposits (Das, K., 2009:23; Lin, J., et al., 2011:252).

The study explores relationships between Digital Transformation and Business Performance of selected South African-based banks over the period 2018/2019.

A limited number of South African-based studies have used non-parametric techniques to investigate the South African Banking industry.

1.7 Definition of terms

Retail Banking - A grouping of financial products and services - offered to the general public - that cater for various Banking needs, namely loans and deposits (Das, K., 2009:23; Lin, J., et al., 2011:252). Furthermore, it pertains to the provision of financial services to the general public, allowing the public to have access to banking services, through various physical and online banking channels. (Majaski, C., 2020).

Banking services - The retail Banking industry provides various Banking services and products to retail Banking customers, namely cash accessibility, settlements, loans, deposits, investments and related assistance (Ahmad, R., 2005:318).

Business Performance - The Business Performance of banks is still predominantly measured calculated using accounting methods by comparing financial ratios associated with liquidity, efficiency, profitability and market value (Ncube, M., 2009).

Exponential Organisations – Businesses that grow at an above-average rate than comparable businesses, using considerably fewer resources (Salim, I., Malone, S., and van Geest, Y. 2014).

Digital Transformation – The use of technology to radically improve the performance or reach of enterprises (Westerman, G., et al, 2014). For the purpose of this study, the definition of Digital Transformation refers to the definition by Westerman, G., et al. (2014).

Business Performance – The quantitative approaches to organisational performance measurement and based on accounting sciences (Neely, A., 2002).

1.8 Assumptions

The following assumptions have been made regarding this study:

- Respondents of primary data have answered surveys accurately and truthfully, and secondary data - publically available audited financial statements containing Business performance indicators - obtained from published financial statements has been produced to the highest level of integrity and is replicable.
- Respondents of primary have reflected normal perspectives and have adequate experience to answer questions.
- A suitable population and sample of South African-based banks are available to participate in the measuring of Digital Maturity during a period of significant uncertainty and unprecedented time, such as the COVID-19 pandemic.
- Psychological and societal impact of COVID-19 may influence the understanding and perceptions of Digital Transformation, the South African Banking industry and impact the study is ways that are not fully comprehended during the duration of the study.

2 LITERATURE REVIEW

2.1 Introduction

This chapter provides insight into Digital Transformation, through the available literature, discussing the origin, evolution, and definitions of Digital Transformation. It delves into the benefits of Digital Transformation in Banking, the success factors of Digital Transformation, and accounting measures of the Business Performance of banks.

2.1.1 *Business and Academic definitions of Digital Transformation*

As much as the concept of Digital Transformation has been defined extensively by literature, it is worth noting that the rise of new technologies and dynamic customer needs is forcing industries to adopt and explore new methods of value-creation, through innovation and experimentation with new business models, reengineering of products, services, processes and organizational structures (Jurgielewicz, K., 2019).

Value-creation resulting from Digital Transformation is typically assessed through Digital Maturity Models, and the application of reputable Digital Maturity models is for the purpose of assessing Digital Maturity in comparison to internal and external aspects of Business performance. There is no common definition for Digital Transformation. Some of the generally accepted definitions of Digital Transformation vary widely and are listed below:

- Chaffey, D., and Carson, J. (2016) suggest Digital Transformation is an initiative and / or program which uses new and / or Digital technologies to introduce general improvement to business operations and output, namely: people, processes, and technology used in the production cycle.
- Demirkan, H., Spohrer, J., and Welser, J. (2016) allude to the use of Digital technologies and an expedited transformation of operating activities,

processes, and business models to deliver opportunities in a strategic and prioritized manner.

- Patano, S., and Rizzotto, F. (2016), position Digital Transformation as being the use of technologies, such as mobile, social media, cloud, big data and data analytics, to generate value and permit new business models, and new relationships.
- SAP SE (2016) suggest Digital Transformation involves minimizing costs and increasing revenues through Digital Technologies (SAP SE, 2016:5).
- The Economist Intelligence Unit Limited (2015) view Digital Transformation as being the enhancement of operating activities and attaining maximum value from Digital technologies, namely: social media, cloud computing, mobile technology, big data and data analytics.
- Tandulwadikar, A. (2014) determines instantaneous transaction monitoring and enhanced processing power are an enabler for near-real-time customer engagement management and produce superior quality of advice. Tandulwadikar, A. (2014) also alludes to beneficial customer experience and faster response to customer needs.
- The OECD (2017) highlight the existence of distinct relationships between Digital technologies and superior operating efficiency, as evidenced by the introduction of robots into the manufacturing industry in the 1900s. The OECD (2017) also suggest the combined use of Digital Technologies such as: sensors, actuators, Big Data, data analytics, AI, cloud computing, and IoT are able to reduce dependency on human labour.
- Stief, S., et al. (2016) provide a contextual view of a wider range of benefits and challenges of Digital Transformation, categorized into "market-orientation", "process-orientation", "technology-orientation", "product-orientation", and "company-orientation". Stief, S., et al. (2016) suggest general opportunities associated with Digital Transformation as superior customer experience and increased customer loyalty, operating efficiency and reduced operating costs.

The definitions on Digital Transformation are largely aligned on the use of Digital Technologies to Digitally Transform and unlock benefits, namely: improved enterprise performance and value creation, superior customer experience and loyalty as well as an inherent reduction on operating costs and increased profitability. As this is an emerging topic, it is largely viewed that the literature on Digital Transformation and Digital Maturity is yet to ultimately agree on the determinants of Digital Maturity. This study attempts to close this gap and makes use of academic research methods to verify the accomplishments of Digital Transformation at an industry level and thus concerned with literature that alludes to ways of demonstrating relationships between Digital Transformation and Business Performance through the use of processes which can be replicated consistently. The research approach is concerned with the views of Cooper, D.R., Schindler, P.S., and Sun, J. (2006), whom allude to internal validity as being the ability of an instrument to consistently measure what it is meant to measure when repeated. The next section discusses Digital Maturity, specific to widely-known pieces of literature, models and frameworks which allude the assessment relationships between Digital Transformation and Business Performance, using methods which share various commonalities and are suggested to be suited to academic research, in terms of validity. Models and frameworks are used to dissect Digital Maturity into constituent parts, and demonstrate how to assess the performance and status of the Digital Transformation and Digital Maturity of an organization.

2.2 The concept and evolution of Digital Transformation

This section reviews the evolution and journey of Digital Transformation as well as the key drivers of Digital Transformation, in the context of the general process of Digitalization.

2.2.1 *Evolution of Information Technology and Digital Transformation*

Entrepreneurial businesses have generally attracted significant interest by investors and shareholder, these businesses are seemingly the drivers of growth, employment, and sustainable business growth (Ang, S., and Cardoza, R.N., 1993). The World Bank views innovation and entrepreneurship as a critical pillar for economies aiming to be “competitive and dynamic”, as well as associating innovation and entrepreneurship with economic growth and job creation (The WorldBank, 2015).

Toldo, L., et al. (2018) reviewed the evolution of information technology transformation over the past 50 years. Appendix C and below highpoints suggest the IT industry has played a pivotal role in generating value, for individuals and businesses.

- In the 1960s, and 1970s, mainframes and PCs delivered industrial automation, and client-server architecture.
- The 1980s, and 1990s saw the birth of the internet and business process automation.
- In the1990’s, and 2000’s, the rapid adoption of the internet had elevated the need for Digitalization and Digital Transformation (Chaffey, D., and Carson, J., 2016:3). Some of the key reasons for failed Digitalization and Digital Transformation, as documented in the literature, are considered to be a grave misunderstanding of customer needs, and a misalignment with business strategy. The use of technology resulted in a spring-board effect, with technological advancements in cloud computing, mobile, big data, and social networks as well as the creation of Digital data platforms and Digital Transformation. Businesses are still playing catch-up as Digital Transformation strategies are seemingly lacking in how they address ever-changing customer needs in a Digital world (Seufert, S., and Meier, C., 2016).

- Since the 2000's, the rise of intelligent technologies has been remarkable, as society appears to be approaching a point where technology will soon be fully capable of driving societal change through the use of technology and science, such as artificial intelligence, machine learning, data analysis, tensor flow, humanoid robotics, big data, augmented reality, virtual reality, 3D printing, edge computing and autonomous vehicles (Dapp, T., 2015:4).

The next section provides an overview of the journey towards the general process of Digital Transformation, as documented in the current literature.

2.2.2 *Areas of business impacted by Digital Transformation*

Whilst businesses tend to lean on technology as an enabler for strategic goals, banks typically have intricate organizational structures with highly-regulated and laborious processes. Historically, businesses had generally set out business structures prior establishing operating processes, and finally designing and implementing technology systems around these operating processes. This approach is largely considered to have produced incoherent technology solutions, designed to solve only the immediate business and customer needs. In contrast, Digital Transformation is interested in changes to organizational structures and is an organization-wide agenda rather than a Technology specific afterthought (Hess, T., Matt, C., Benlian, A., and Wiesböck, F. 2016). Hess, T. et al. (2016) maintains that Digital Transformation involves finding solutions for complex issues that may impact multiple business units, and that one should consider solutions that include both technology and non-technology components. Hess, T. et al. (2016) outline 4 key dimensions of Digital Transformation:

1. the use of technology;
2. organizational structures and governance frameworks;
3. the production of value; and

4. organisational and stakeholder funding preference.

2.2.3 *Drivers of Digital Transformation*

Key stakeholders in the South African Banking industry as well as literature, and leading technology manufacturers are generally aligned on the drivers of Digital Transformation, noteworthy drivers are discussed below.

2.2.3.1 *Threat of disruptors*

The threat of disruptors in the financial services industry has previously presented banks with the option of merging and / or acquiring new technology capabilities, acquiring market-disruptors, or partner up with technology providers (Microsoft, 2016:11). The disadvantage which banks have with the execution of any of these options is the ability to execute in an agile manner, deemed pleasing to regulatory bodies and shareholders. Microsoft (2016:11) present a view of drivers for Digital Transformation initiatives (see Appendix - F), listed in order of importance and based on the industry perception of the primary motives and drivers of Digital Transformation.

2.2.3.2 *Improving Customer experience*

Digital Transformation strategy in Banking is generally targeted towards developing seamless customer experiences across customer touch-points, and the integration of organizational processes (Economist Intelligence Unit Limited, 2015:9). Economist Intelligence Unit Limited (2015:8) alludes to superior customer experience as having been demonstrated by the Digital channels of exponential-organisations such as: Amazon, Google, and Facebook, and further suggest these exponential-organisations are setting the standard for superior Digital engagement.

2.2.3.3 *A transforming competitive landscape*

Cisco (2017:4) view Digital banks and FinTechs as being more ‘Digitally savvy’ and agile than their counterparts, and propose agility as being key towards any type of innovation, Digital Transformation and superior customer-centric distribution models. It is also believed that Banks are embracing cultures that are in support of Digital disruption, and are obsessed with being customer-centric (Andrus, G., Kejriwal, S., and Wadhwani, R., 2016).

2.2.3.4 *Regulatory environment and Macroeconomic challenges*

Some of the major players in the South African Banking industry have highlighted a shift in consumer payment methods, with Digital and contactless payments accounting for 15% of overall payments in the 2019/2020 financial year (Bankserve, 2020). This shift is confirmed by mobile payment solutions providers, having reported turnover growth of up to 65% for the 2019/2020 financial period (Bankserve, 2020). Bankserve (2020) attributes the growth in Digital and contactless payments directly to the impact of the COVID-19. The ongoing regulation of data prices by the South African Competition Commission (Competition Commission, 2019) as well as the social impact of Covid-19 and the freeing-up of the emergency spectrum by the South African government is largely considered to have reinforced this shift, enabling consumers to spend more time online during the COVID-19 lockdown periods.

A solid foundation for governance controls is set out by the Financial Intelligence Centre Amendment Act, 2017. Under this Act, South African-based banks are obligated to: follow a risk-based approach to client identification and verification; have rigorous customer-due-diligence measures, which includes ownership and persons in prominent and influential positions, and maintain identity and verification and transaction records. This is noteworthy as it is generally accepted that a favorable regulatory framework is key to the success of emerging payment

solutions. The success of Mobile Payments services, namely M-Pesa, in countries such as Kenya, Zimbabwe and Uganda, and AliPay in China corroborates this view (Lee, D.K.C., and Teo, E. 2015).

2.2.3.5 *Customer demand*

Banks are under scrutiny by hackers, constantly scanning for vulnerabilities and at the same time, they are under pressure to upgrade their technology architectures to be compatible with native and hybrid mobile technologies (Intel and Red Hat, 2016:1-18). Additional pressure is in the form of customer demand, as more and more customers gravitate towards convenient Digital channels, Banks are having to modernize technology systems in order to remain relevant to customers (Intel and Red Hat, 2016:2 and van der Meulen (2017).

2.2.3.6 *The move to "mobile first" initiatives and Digital disruption*

The changing pace of technology-advancement is something businesses must embrace, whilst the failure to adapt successfully has resulted result in grave consequences, such as mass closures of banking branches in South Africa (The Citizen, 2019 and BusinessTech, 2020). Branch closures are not unique to South Africa and the shift from physical branches to online banking is the result of disruptions resulting from new technologies, including mobile internet (Manyika, J., Dobbs, R., Chui, M., Bughin, J., and Bisson, P., 2013). According to the Digital Vortex adapted from Wade, M., Yokoi, T., Shan, J., and Macaulay, J. (2019) in Appendix – D and Appendix - E, assessment outcomes for 2017 and 2019 map out industries according to the degree of potential to the digitization of business models, and consistently place financial services in the top-5 industries, most vulnerable to Digital disruption.

2.3 Literature, Models and Frameworks on Digital Maturity

Models and Frameworks on Digital Maturity offer a standardized and structured means of assessing the underlying factors which constitute Digital Maturity, and where the ongoing assessment provides a quantitative and objective view of the performance of the journey towards Digital Transformation.

The study has not reviewed all of the available literature of Digital Transformation relevant to the South African Banking industry, rather it discusses widely-known pieces of literature that have been generally accepted to provide a wide-ranging understanding of the Digital Maturity. In addition, the models considered provide a quantified means of assessing where an organisation finds itself on its Digital Transformation journey, in the context of Exponential organisations. These Digital Maturity models share various commonalities and aim to provide clarity on the following key aspects of Digital Maturity:

- assessing the set of factors that constitute Digital Maturity;
- assessing the relationships amongst these factors as well as the status of the Digital Maturity of an organisation, in relation to Digital Transformation;
- the factors of Digital Maturity requiring additional focus, in order to improve the overall Digital Maturity and enable an organisation to achieve its strategic objectives.

2.3.1 *Exponential Organisations*

To remain abreast of customer needs businesses have been experimenting more than ever with Digital technologies and capabilities such as sensors, artificial intelligence, micropayments, driverless vehicles, 3D printing, virtual reality, augmented reality and tensor flow.

Salim, I. et al. (2014) present Exponential Organisations as being the result of the superior application and continuous refinement of Digital technologies and

capabilities, such as sensors, artificial intelligence, micropayments, driverless vehicles, 3D printing, virtual reality, augmented reality and tensor flow. Digital technologies are considered to be the reason behind above-average business growth, and the birth of platform business models that have displaced industries such as: publishing, music, movies, retail, gaming, and others.

2.3.2 *Kane's Technology Fallacy Model*

In The Technology Fallacy, Kane, G., Phillips, A., Copulsky, R., and Andrus, G. (2019) has been based on research conducted in partnership with MIT-Sloan business school and Deloitte. Kane, G. et al. (2019) surveyed approximately 16,000 business leaders and conducted interview, which lead to the view that it is imperative for business leaders to have an in-depth understanding of technology in order to take advantage of the opportunities unlocked through use of Digital technologies, as well as the ability for technology to mitigate organisational risk and transform organisations.

Under the Technology Fallacy Model, Kane, G. et al. (2019) discusses workplace disruption as emanating from Digital technologies. The Technology Fallacy is intended to be a survival guide for businesses seeking to harness the influence of technology and unlock value through Digital Transformation. The subject of Digital Transformation is viewed as a driver for change of organizational dynamics and execution of work tasks.

Kane, G. et al. (2019) also discuss Digital Technologies as causing disruption to all organizations, cautioning business leaders to identify and leverage technologies capable of enable organizations to become more competitive. This perspective offers business leaders a guide for surviving Digital disruption, it also discusses the necessary organizational changes required to harness the

influence of technology (and its ability to support organisations). The suggested response to Digital disruption is through changing company culture to be more agile, risk tolerant, and experimental. Kane, G. et al. (2019) discuss how effective Digital Transformation must include change to people and organisational dynamics, along with the deployment of suitable technologies.

2.3.3 *Evans' Mastering Digital Business Model*

In the Mastering Digital Business Model Evans, N.D. (2017) discusses the application of Digital Transformation as a means of redesigning traditional business models and strategies, in the context of new disruptive technologies, Digitally-savvy consumers, and a globally connected society. Evans, N.D. (2017) views technologies such as: e-commerce, enterprise systems, supply chain integration, business process automation and robotics have enabled businesses to operate in ways like never before, as well as to continue to change the engagement models between businesses and customers. Evans, N.D. (2017) also depicts technology as being the backbone for businesses wanting to transform and produce superior business value-chains.

2.3.4 *Rogers' Digital Transformation Playbook Model*

The Digital Transformation Playbook by Rogers, D. (2016) portrays Digital Transformation as a holistic change, and must include change to business strategy, culture, operating model, staff engagement, and way of thinking. Rogers, D. (2016) has shared critical insights about how Digital Transformation involves not only technology but a holistic change of organisational strategy and entirely new ways of working, engagement and thinking. Traditional businesses and leadership styles are finding it challenging to cope with changing regulations and environments in the Digital era. Business and Digital Transformation require us to unlearn old ways of working, embracing new strategic assumptions within all areas of businesses. The Digital Transformation Playbook presents strategic

domains of Digital Transformation, namely: Customers (moving from analogue to Digital to harness customer networks), Competition (moving from analogue to Digital to go beyond products and to develop and or leverage platforms), Data (moving from analogue to Digital and converting data into value-creating assets), Innovation (moving from analogue to Digital and innovating with rapid experimentation) and Value (moving from analogue to Digital and adapting value chains and value proposition).

2.3.5 *Wersterman's Leading Digital Framework*

In Leading Digital, Westerman, G., et al. (2014) list the effects of globalisation, shifting value pools, changing demographics and, technological advancement as the biggest drivers of change. The advancement of technology is discussed as something which is changing at a significant rate, enabling new ways of social communication and online habits through the explosion of Social Media as well as the emergence of Cloud computing and serverless computing are driving consumption of technology via on an on-demand basis.

Westerman, G., et al. (2014) had considered a collective approach towards Digital Transformation, where all participating in any form of Digital Transformation continue to do so with the sole purpose of becoming a master of digitisation. Leading Digital positions Digital Masters as needing to leverage technology to unlock profits and increase profitability as well as to unlock efficiencies within businesses. Digital masters are further viewed as being good at increasing and unlocking profits, making 26% more profits or unlocking of profits than their non-Digital savvy peers. Although approximately 90% of organisations do not deliver technology for a living, this does not mean that a competitive advantage cannot be attained through leveraging shifts in technology. Westerman, G., et al. (2014) further discuss conceptualizing the possibility of almost anything, through Digital Mastery, as well as a shared responsibility towards Digital Transformation.

Westerman's Leading Digital Framework (see Appendix - I and Appendix – J) is arguably the piece of literature that features evidence of links between Digital maturity and Business Performance. This section further unpacks Westerman's Leading Digital Framework (see Appendix - I and Appendix – J), with the aim of gaining a deeper understanding of the links between Digital maturity and Business Performance, as being able to demonstrate this is key to the purpose of this study. This study considers the definition by Westerman, G., et al, (2014) definition of Digital Transformation, namely: The use of technology to radically improve the performance or reach of enterprises.

Westerman, G., et al. (2014) model encompasses 2 dimensions, represented as two-axes of a chart (see Figure 1 and Appendix – J), namely Leadership Capabilities and Digital Capabilities, the dimensions are underpinned by their respective factors.

Leadership and Strategy capabilities are concerned with the enabling of organizational structures. Directed towards the factors which constitute the transformative nature of the Digital Transformation vision, the Digital engagement across an organisation, organisational governance and control structures, and technology leadership and alignment within the organization. The factors of Digital Maturity which underpin Leadership and Strategy:

- Vision and Intent,
- Culture and Engagement
- Governance and Organisation,
- New Value Streams and Business Models,
- Investment and Innovation,

The Digital Enablement and Adoption capabilities are concerned with the use of Digital technologies in core organizational functions and processes. Directed towards enabling the factors of Digital Transformation, namely customer

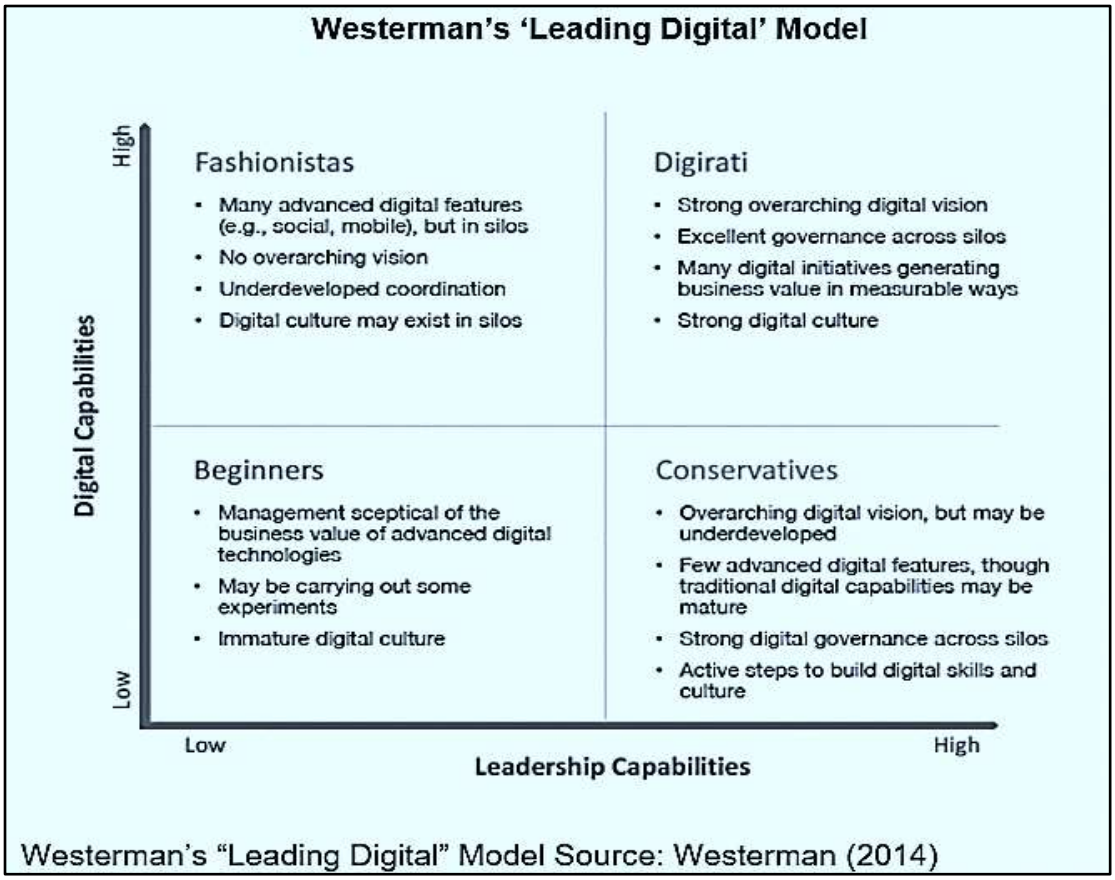
experience, core operational processes, and new business models. Digital Maturity factors which underpin Digital Enablement and Adoption:

- Customer Orientation and Engagement
- Technology and Data Embeddedness,
- Workforce Enablement and Skills
- Operations and Core Processes

This framework illustrates that truly exceptional Digital performer's approach the upper-right boundary of the framework, while capable but imperfect performers are map to the bottom-right and upper-left quadrants (see Figure 1). The lower-left quadrant is the domain of the Digital laggard. Putting the quadrants together produces the following levels of Digital mastery:

- Digital Masters excel at both dimensions, organisations generally tend to be strong on leadership capabilities but weak on digital capabilities, or vice versa. Digital Masters do not have incompatible business processes and systems. One of the key benefits Digital Masters' benefit from is increased profits, as well as employees, are able to collaborate extensively without any counter-productive hindrances, achieved through excelling at both dimensions.
- Fashionistas have a capability profile that mirrors the opposite of Conservatives, where they tend to invest comprehensively in technology, yet also lack Digital leadership and governance needed to ensure well-rounded Digital capabilities that are both fully integrated into the technology ecosystem and devoid of legacy components. These organisations are generally set-up to allow employees to collaborate within their silos but are not able to tap into synergies across the company, as well as possessing disparity across the technology solutions and vendors. The disparity and silos are something that hinders return on investment, obstructs customer engagement and an integrated view of business operations.

- Conservatives exhibit useful digital leadership capabilities, however, their approach of extreme-caution prevents these organisations from a continuous strengthening of Digital capabilities. These organisations tend to a careful consideration towards every Digital investment. Leaders in these organisations contend with significant governance mechanisms and limited resources and are usually concerned with making mistakes that would waste their scarce effort, and funding.
- Beginners are embarking on their digital journey, the following approaches are generally opted for: trial-and-error or follow-the-leader. Beginners have only basic digital capabilities, often lagging behind their competitors and fail to explore the financial benefits associated with being a Digital Master.



Westerman's "Leading Digital" Model Source: Westerman (2014)

Figure 1: Westerman's 'Leading Digital' Model

Westerman, G., et al. (2014) present how performance differences for Digital Masters is narrowed down to Digital and leadership capabilities, as the key to unlocking enhanced levels of performance, and how companies that have exceeded in either 1 of the Digital dimensions - Leadership Capabilities or Digital Capabilities – also managed to out-perform industry competitors to some degree. In addition, Westerman, G., et al. (2014) further suggest that companies that have exceled in both Digital dimensions are classified as Digital Masters and had vastly out-performed industry competitors, as assessed through a set of Business performance indicators, namely:

- Revenue per employee
- Fixed-Asset turnover
- Earnings margins
- Net-profit margin

2.4 Selection of Fit-For-Purpose Models and Frameworks on Digital Maturity

This sections discusses the commonalities amongst the Models and Frameworks on Digital Maturity. This section also discusses the alignment of Models and Frameworks to the research objectives:

- RO-1: Whether or not there is a relationship between Digital maturity and accounting measures of Business Performance, namely: CAR, CTIR, CLR, EBITM, FATR, NPM, RER, RoA and RoE.
- RO-2: Whether or not accounting measures of Business Performance is a proxy for Digital maturity in Banking.

There has been an explosion of academic literature on the topic of Digital Transformation and Digital Maturity over the last decade, and in the post COVID-

19 period. It is not meaningful to review all literature, based on the alignment to the research objectives, and thus the study considers common themes and points of convergence amongst the generally accepted Models and Frameworks.

2.4.1 *Kane's Technology Fallacy Model*

In The Technology Fallacy model, Kane et al. (2019) argue that whilst technology is important, the most important challenge of digital transformation is related to people, and leadership, and how vital it is for business leaders to have insight into the uses, and application of technology when transforming businesses. At the basis of the argument, Kane et al. (2019) view Digital Maturity and Digital Transformation as relating to people and their ability to manage organizational change as well as to exploit opportunities afforded by the implementation of technology capabilities. Furthermore, the Technology Fallacy model recognizes the need for courage, balance, common sense, and collaboration, as well as organizational culture as being the critical to the 3 step process for assessing and increasing Digital maturity in businesses.

2.4.2 *Evan's Mastering Digital Business Model*

In the Mastering Digital Business model, Evans, N.D. (2017) views the various applications of new technologies as being the key to Digital Transformation, and his model assesses the extent of Digital Transformation, as achieved by the various ways of applying disruptive technologies. The model considers the application of disruptive technologies, and adoption of platform business models as being the basis for accomplishing digital services mastery. Evans, N.D. (2017) also views Digital Transformation as forming part of leadership strategy and vision, intended to establish and manage transformation objectives, Digital Transformation focus, targeted business outcomes, as well as the attaining of a customer-centric perspective throughout the re-designing of business models and

business processes. The model views Digital Transformation as needing an innovative and collaborative culture to enable tolerance and receptivity to risk. The model positions leadership as being key to empowering change, and encouraging innovation and experimentation. The model intends for leadership to oversee and manage processes and governance in a manner that enables transformation throughout traditional business structures and divides. Similarly to the Technology Fallacy model by Kane et al. (2019), the Mastering Digital Business model by Evans, N.D. (2017) considers the application of new technologies and the re-designing of business models, such as platform business models geared towards multi-dimensional value networks, as being key to creating unique new value propositions for customers.

2.4.3 *Rogers' Digital Transformation Playbook Model*

The Digital Transformation Playbook by Rogers, D. (2016) is aligned to the Mastering Digital Business model, as both portrays Digital Transformation as a holistic change, achieved through combined change to business strategy, culture, operating model, staff engagement, and way of thinking. In the Digital Transformation Playbook, Rogers, D. (2016) proposes 5 domains of Digital Transformation and Digital Maturity, as discussed under section 2.2.3. Kane et al. (2019), Evans, N.D. (2017) and Rogers, D. (2016) are also aligned on the views that businesses are capable of establishing and maintaining a competitive-edge through the experimentation and application of business models as well as that businesses must continually assess, and leverage changing customer-needs as a basis for driving transformation that is aimed at producing customer-value. In addition, there is also alignment on the need for businesses to exhibit a culture of innovation, and experimentation, and for this culture to be driven by leadership. Furthermore, Kane et al. (2019), Evans, N.D. (2017), and Rogers, D. (2016) are aligned on the views of remaining abreast of customer needs and habits, with Rogers, D. (2016) placing focus on customers and lists 3 focus areas for creating

and harnessing customer networks, namely: digital channels focused on changing customers habits pertaining to the purchase and consumption of goods and services; the use of marketing to inspire, lure and collaborate with customers, and customer advocacy as being the ultimate influencer of reputation and brand perception. As with the Technology Fallacy model by Kane et al. (2019) and the Mastering Digital Business model by Evans, N.D. (2017), the Digital Transformation Playbook by Rogers, D. (2016) leverages data as being key enabler for understanding general problems impacting businesses, producing superior customer-insights, and enabling data driving decision-making.

2.4.4 ***Westerman's Leading Digital Framework***

Westerman, G., et al. (2014) propose the Westerman's Leading Digital framework may be used to assess Digital maturity in businesses, and they consider a collective approach towards Digital Transformation, where businesses participating in any form of Digital Transformation continue to do so with the sole purpose of becoming a master of digitization. The Westerman's Leading Digital framework discusses how to measure the overarching dimensions of Digital Maturity, namely: Leadership, and Strategy capabilities, concerned with the enabling of organizational structures, and Digital Enablement, and Adoption, concerned with the use of Digital technologies in core business functions and processes, and are directed towards enabling the factors of Digital Transformation, namely: customer experience, core operational processes, and new business models.

Westerman's Leading Digital framework (see Appendix - I and Appendix – J) is aligned to the Technology Fallacy model by Kane et al. (2019) and the Mastering Digital Business model by Evans, N.D. (2017), the Digital Transformation Playbook by Rogers, D. (2016), and their views on enabling businesses to create value through the application of digital technologies, as well as to digitally

transform customer experience, core operational processes and apply new business models. In addition, the Westerman's Leading Digital framework features evidence of links between higher levels of Digital Maturity, and Business Performance, in terms of profitability, this feature is not clearly listed under other Models and Frameworks researched by the study.

In conclusion, Westerman, G., et al. (2014), Kane et al. (2019) and Evans, N.D. (2017), Rogers, D. (2016) are generally aligned on the views, purpose, uses and outcomes of Digital Maturity and Digital Transformation. However, Kane et al. (2019) views leadership and their understanding of the use of technology as leading factor for achieving successful Digital Transformation, Westerman, G., et al. (2014), Evans, N.D. (2017) and Rogers, D. (2016) views culture, leadership, change management and the use of technology as equally important. In addition, Westerman's Leading Digital framework (see Appendix - I and Appendix – J) features evidence of links between Digital Maturity, and Business Performance, this aspect is well aligned with the purpose and objectives of the study. The study has thus selected Westerman's Leading Digital framework (see Appendix - I and Appendix – J) to explore relationships between Digital Transformation and Business Performance, as the framework features direct links between Digital Transformation and Business Performance. The study demonstrates the Westerman Leading Digital framework, and places focus on the on Business Performance indicators specified by Westerman, G., et al. (2014) as well as performance indicators that are common across the financial statements published by the South African-based banks that participated in the study.

2.5 Business Performance in Banking

This section discusses Business Performance and Business Performance indicators, specific to Banking and relevant to Westerman's Leading Digital Framework.

2.5.1 *Definition of Business Performance*

Neely, A. (2002:3) alludes to Business Performance as being a quantitative approach of using financial measures - also known as Business Performance indicators - to assess the performance of a business and its resources.

Business performance indicators express the performance and success of a business in monetary terms and are regulated under the rules of the General Accepted Accounting Principles (GAAP) and International Financial Reporting Standards (IFRS), the international accounting rules and standards used to govern financial reporting produced by organisations such as banks. Due to its established nature, financial measures are generally accepted and more popular than non-financial measures. Business performance is measured in financial terms through key measures, namely: descriptive and analytical measures:

- Descriptive measures comprises: total assets, total liabilities, stockholders equity, total revenues, total expenses and net income.
- Analytical measures comprises: profitability, efficiency, liquidity and solvency measures.

Assessing the overall Business Performance of a business is generally done via the income statement and the balance sheet, as the income statement is used to illustrate operating performance in terms of revenues and expenses, and the balance sheet is used to illustrate a summary of the financial balances.

The International Forum on Accountancy Development (IFAD) was established as a working group between various key role-players, subscribed to: a joint mission that is underpinned by the enhancement of market security and transparency, and global financial stability. Amongst the prominent role-players are: the Basel Committee, IFAD, the Organisation for Economic Co-operation and Development (OECD), United Nations Conference on Trade and Development (UNCTAD), the World Bank and regional development banks. The key objectives of IFAD, and which drives the financial reporting of financial institutions globally,

are: the promotion of transparent financial reporting and the cooperation between governments, international financial institutions, regulators, standard setters, capital providers and issuers.

Competitive aggressiveness has been characterized as the propensity to directly challenge rivals by taking competitive actions (Stambaugh, J., 1996). The nature of competitive advantage differs from pro-activeness as it responds to competitors rather than the environmental opportunity; the manner in which organisations respond to competitors is usually informed by profits, as measured by financial ratios. Financial ratios, also referred to as Business Performance ratios, have long been the foundation for Business Performance measurement, used to express performance in monetary terms and provide a high level of aggregation of information. Financial ratios are largely accepted and remain popular among organisations and individuals, with non-financial measures - such as customer satisfaction, market share, quality and sentiment – being used as secondary to financial ratios. In addition, financial ratios have been established over periods and are frequently relied upon due to their nature of uniformity.

Academic research on the performance of various Banking sectors around the world tend to focus on different aspects of business performance and the factors affecting it, however, majority tend to focus on the effects of bank-specific and macroeconomic factors on profitability, namely: liquidity ratios, efficiency ratios and profitability ratios (Antoun, R., Ali Coskun, A., Georgevski, B., 2018).

The income statement and balance sheet are key reports used during the assessment of the overall financial condition of an organisation, the income statement presents operating performance and whilst the balance sheet presents an organisation’s net worth. Business Performance is generally defined as a measurement of the outcome of an organisation's governance framework and

operating performance in monetary terms, and assessed using the following descriptive and analytics measures of financial performance:

- Descriptive measures could include: Total expenses and revenues, total assets and liabilities, shareholders equity, and net income;
- Analytical measures comprise include: efficiency, liquidity, solvency and profits.

The next section discusses the Business Performance indicators that are common across South African-based banks that participated in the study as well as their relevance to literature, namely: CAR, CTIR, CLR, EBITM, FATR, NPM, RER, RoA and RoE. In addition, this section provides input into the progression and establishment of Business Performance indicators.

The underlying concern with considering only certain or partial financial indicators is that it does not include all the inputs and outputs considered by the econometric approach and may thus not produce an all-inclusive performance measure of a bank's operating activities (Oberholzer, M., and Van der Westhuizen, G., 2004). The 3 most important economic efficiency concepts, for measuring efficiency in Banking, are cost, profit, and alternative profit efficiency (Berger, A.N., and Mester, L.J., 1993).

- Cost Efficiency: According to Berger, A.N., and Mester, L.J. (1993), cost efficiency is derived from a cost function in which variable costs depend on the input prices, quantities of variable outputs, and any fixed inputs or outputs, environmental factors, random error, and operational efficiency (See appendix – L).
- Profit Efficiency: Profit efficiency is the adjusting of outputs and inputs to earn maximum profits and is considered to be superior to cost efficiency, to evaluate overall Business Performance (Berger, A.N., and Mester, L.J., 1993). Profit efficiency is concerned with attaining maximum profits by splitting focus between maximizing marginal revenue and reducing

marginal costs. Profit efficiency considers both input and output inefficiencies (Vivas, A.L., 1997).

- Alternative Profit Efficiency: The alternative profit efficiency measures how close a bank is to generate maximum profits against its output levels, and considers the same dependent variables as the standard profit function and the same external variables as the cost function (Isik, I., and Hassan, M.K., 2002).

2.5.2 *Relationship between cost efficiency and profit efficiency*

Berger, A.N., Hunter, W.C., and Timme, S.G. (1993: 221) allude to improved profits through efficient production of business outputs. McKinsey (2019) are aligned and expanded in saying that Banks which have successfully deployed Digital technologies are more likely to have reduced operating costs and higher outputs.

2.5.3 *Efficiency Measurement Methods*

The accounting approach and econometric approach are widely used for measuring cost and profit efficiency, as a general indication of how well the assets of an organisation are used within the business operating environment.

2.5.3.1 *Accounting approach*

Variables such as total assets, total deposits, loans, gross operating income are generally used in any combination to assess the output of bank's (Fukuyama, T., 1993). In addition, cost to income ratio is widely used to measure cost efficiency and how effectively the assets of a businesses are used with the operating environment (Isik, I., and Hassan, M.K., 2000).

2.5.3.2 *Econometric Approach*

The Econometric approach considers efficiency as the actual level of cost relative to production and assesses numerical efficiency values to identify areas of input overuse and/or inefficient utilization of assets (Fuentes, R., and Vegara, M., 2003). Bauer and Hancock (1993) mention 2 econometric techniques as noteworthy when assess the certain aspects of Business Performance, namely: Parametric techniques and Non-parametric techniques.

- Parametric techniques comprise the following:
    - Stochastic Frontier Approach (SFA), is a statistical analysis technique used to estimate production or cost functions in banks and identification of inefficiency in operating activity (Maudos, J., Pastor, J.M., Perez, F., and Quesada, J., 2002).
    - Distribution-free approach, which automatically assumes an underlying and persistent inefficiency that may resolve over some time.
    - Thick frontier approach provides a firmer basis for deriving the potential efficiency of an industry (Vivas, A.L., 1997).
- Non-parametric techniques comprise the following:
    - DEA technique automatically assumes deviations between observed costs and minimum costs, as a result of the inefficient operational activity (Maudos, J., et al., 2002). The DEA framework is general and ideal for multi-dimensional evaluations of Business Performance. DEA analysis is flexible, allowing a varying array of data on the quantity of inputs and outputs.
    - Free Disposable Hull Analysis measures the efficiency of production units. Previous studies that use non-parametric have highlighted a predisposition, leniency towards lower efficiency, as well as the

technique, overlooks statistical measurement error (Kaparakis, E., et al., 1994; Vennet, R.D., 2002).

Farrell, M.J. (1957) presented a frontier based efficiency model, for measuring various levels of efficiency, across organisations, sectors and countries. The application of the frontier efficiency model as DEA and assumes the frontier to have a Constant Returns to Scale (CRS) was used to compare the financial results of financial institutions (Charnes, A., Cooper, W., and Rhodes, E., 1978). Berger, A. N., and Humphrey, D. B. (1997) considered this when comparing the results of financial institutions, namely: banks, credit unions, insurance firms and savings and loans, and had achieved this by surveying 130 research studies. Sherman, H.D., and Gold, F. (1985) managed to perform extensive exploration of operational efficiency of bank branches using DEA, and the DEA frontier continues to be used for efficiency analysis in the Banking industry. However, DEA does present limitations when assessing liquidity, profitability and market valuations. This limitation cannot be ignored on the basis of an exploratory study.

Non-parametric techniques are generally used to assess Business Performance (Berger, A. N., and Humphrey, D. B., 1997). The Business Performance of banks is predominantly measured using accounting methods by comparing financial ratios associated with liquidity, efficiency, profitability and market value (Ncube, M., 2009). As there remains no consensus amongst researchers on any standard means of measuring Business Performance, rather, it is suggested to select variables and financial ratios based on interest and intended purpose (Sealey, C., and Lindley, J., 1977; Kaparakis, E., et al., 1994; Zaim, 1995).

2.6 The relationship between Digital Transformation and Business Performance

This section draws from existing literature on Digital Transformation and Business Performance, and reviews Digital Transformation and Business Performance in the context of exploring the existence of relationships between Digital Transformation and Business Performance of banks. This section recognises Digital Transformation as an area that exhibits continuous change, as a result of the race towards maximum profit-extraction from ever-changing consumer needs.

Westerman, G., et al. (2014) presents Digital Transformation as the use of technology to radically improve the performance and / or operating reach of businesses. Westerman, G., et al. (2014) also appeal to businesses to think seriously about how to become Digital Masters when conceptualizing possibilities and executing building core Digital capabilities.

Westerman, G., et al. (2014) view the advancements of technology as having assisted an uprising of new business models, leveraging; social media, mobile computing, data analytics, smartphones, and cloud computing and furthermore see the implementation of Digital Transformation as involving focused investment, a Digitally mobilized organisation and sustained transition. Westerman, G., et al. (2014) present the Digital Mastery framework, for use in measuring Digital maturity in businesses, the framework features evidence of links between Digital Maturity, and Business Performance, and alludes to a process for sustaining transformation, namely: building foundational capabilities, aligning incentives and rewards, followed by continual measurement and assessment of the operating environment (see Appendix – J). This study is interested in exploring these links and has applied Westerman's Leading Digital Framework (see Appendix - I and Appendix – J), using an extended format which sufficiently covers the following areas:

- Vision and Intent

- Culture and Engagement
- Governance and Organisation
- New value streams and Business models
- Innovation and Investment
- Customer orientation and Engagement
- Technology and Data embeddedness
- Workforce enablement and Skills
- Operations and Core processes

2.7 Digital Transformation in Banking

This section discusses Digital Transformation in Banking, with specific attention to retail banking in 2020.

The Global Banking industry is in the process of transforming its business model from a traditional product-focused model to a customer-centric business model, encapsulating partnerships, customers, and ecosystems.

2.7.1 *The South African Banking industry in 2020*

As at December 2019, the South African Banking industry comprised 42 South African Banking institutions, and 30 foreign banks with offices in South Africa, with the 4 largest banks holding 90% of total assets, amounting to R5.74-trillion (Research and Markets, 2019). The average cost to income ratio for the 5 largest banks, namely: Amalgamated Banks of South Africa (ABSA), Capitec Bank, First National Bank (FNB), Nedbank and Standard Bank, was calculated to be 55.1%, based on resulted at period ended June 2019 (PWC, 2019). Approximately 4 of the 5 largest banks are weighed down by monolithic technology systems and share a high cost-to-income ratio, attributed to factors such as high staff costs,

slowing revenue growth, increasing compliance costs, and high costs to maintain legacy systems (Protiviti, 2018).

The recent emergence of Digital Banks, namely: Discovery Bank, UBank, BankZero and Tyme Bank, and payment FinTech businesses in the South African Banking industry has always been thought to be the beginning of the end of traditional Banks, with a physical presence (PwC, 2014). Digital Banks and FinTech businesses have minimal physical presence and offer bespoke engagements through customer-centric technology ecosystems, comprising interrelated products and channels. Digital Banks have developed a new leading-edge through speedy implementation of disruptive technologies and agility in driving Digital engagement (PWC, 2017). Digital Banks boast having minimal physical branches - leveraging the retail payment terminals as a distribution network - and are extremely agile in their ability to change in shape and size.

The South African Banking industry has realized that FinTechs are capable of circumventing the highly-regulated South African banking governance, and for this reason banks are changing their business models at a rapid pace, to avoid becoming irrelevant and displaced (PWC, 2014). The industry has prioritized the evolution and shift towards Digital banking channels (Jaubert, M., Ullrich, M., Dela, R., Marcu, S., and Malbate, J, 2014:1). This shift is not without its challenges, as traditional banks have been working tirelessly to adapt and experiment with new operating models, split between regulatory requirements and the evolution of Digital banking channels.

2.7.2 *The business case for Digital Transformation*

A survey conducted by CIO.com (2018) highlights the following key findings in the relationship between business and technology (see Appendix - B):

- Technology is actively scanning for business areas needing to undergo Digital Transformation;
- Business Executives are largely responsible to identify emerging technologies for Digital Transformation and manage the execution of Digital Transformation plans.

Kuratko, D.F., Hornsby, J.S., and Goldsby, M.G. (2004), are ostensibly unconvinced about the ability of legacy business-as-usual approaches to hold out against the demands of tech-savvy customers and future challenges. In addition, Harter, H.K., Schmidt, F.L., Asplund, J.W., Killham, E.A., and Agrawal, A. (2010), believes that Banks should mitigate risks associated with implementing newer technologies, through an expansive approach towards execution of business strategy, mandating innovation and entrepreneurship within the business strategy.

The recent mass-closure of banking branches in South Africa speaks volumes about Digital Transformation, as banks are finding it expensive to operate through physical branches. Banks are seemingly focusing their efforts towards Digital Transformation on the following 6 priority areas of technology innovation (Sullivan, B., Garvey, J., Alcocer, J., and Eldridge, A., 2014:6):

- Customer-centric business models;
- Omni-channel distribution;
- Simplified operating models;
- Knowledge management and insights based decision-making;
- Innovation and entrepreneurship; and
- Risk management.

The 6 priority areas is aligned to current literature, the concern however is that Banks are perceived to be following a stop-gap approach towards implementing new technologies and Digital Transformation, negating total transformation of legacy systems and opting to deploy systems in a rather isolated and siloed fashion (Tandulwadikar, A., 2014:5).

2.8 Selection of Fit-For-Purpose Business Performance indicators

Financial ratios are used to conduct analysis of the financial performance of an organisation, and provide a standardized means of assessing the financial performance of organisations, and have been grouped into the following categories indicators:

- Liquidity ratios are considered during the assessment of an organisation's ability to meet its short-term and long-term obligations, and is concerned with assets, assessing an organisation's cash, assets and liabilities.
- Leverage ratios are used to assess of an organisation's debt levels, and is mainly concerned with assessing an organisation's liabilities against equities and operating income.
- Efficiency ratios provide insight into how well an organisation utilizes its assets and resources. The assessment of efficiency ratios is mainly concerned with the movement of inventory from the production line and into the hands of customers, conversion to sales and ability to generate sales from assets.
- Profitability ratios are concerned with an organisation's ability to generate income relative to operating costs, revenue and equity as well as its balance sheet. Profitability ratios consider an organisation's ability to operate efficiently, comparing operating income to net sales, as well as how well an organization uses its shareholders equity and assets to generate income.

- Market value ratios are largely concerned with the valuation of the value and share price of an organization. These ratios are concerned with value creation for shareholders and if the value of a share is worthwhile in comparison to other shares.

The Business Performance indicators specified by Westerman, G., et al (2014) as well as the performance indicators which are common across the financial statements published by the South African-based banks whom participated in the study are suitable to assess liquidity, efficiency, profitability, and market value and are listed as follows: CAR, CTIR, CLR, EBITM, FATR, NPM, RER, RoA and RoE. These indicators are discuss below:

1. RER - Revenue per employee is determined by dividing total revenue generated by the number of employees. This ratio provides an indication of the profitability and efficiency in terms of how much income each employee generates for an organisation.
2. FATR - Fixed Asset Turnover Ratio is generally used during the assessment of organisational efficiency and profitability, providing insight into the ability of an organisation to generate net sales from fixed-asset investments.
3. EBITM - Earnings Before Interest and Tax Margin produces a view of an organisation’s profitability as a percentage of revenues.
4. NPM - Net Profit Margin is the ratio of after-tax profits to net sales and is used to illustrate the remaining profit after all costs of production, administration, and financing have been deducted from sales, and income taxes recognized.
5. RoE - Return on Equity is a profitability ratio and refers to how much profit a company earned compared to the total amount of shareholder equity invested. A business that has a high return on equity is more likely to generate cash internally.
6. RoA - Return on Asset is a profitability ratio that illustrates the financial performance of an organisation. ROA is the net income for the year divided

by total assets, and measures the ability of the bank management to generate income by utilizing company assets at their disposal. It further indicates the efficiency of the management of a company in generating a net income from its resources.

7. CLR - Credit Loss Ratio is used by financial institutions that sell mortgage-backed securities, and is considered during the assessment of liquidity and leverage ratios. Credit Loss ratios provide insight into the risk assumed by a financial institution.
8. CTIR - Cost-To-Income ratio is assessed by dividing operating costs by operating income, and is used to determine the value of an organisation relative to liquidity, profitability and efficiency.
9. CAR - Capital Adequacy ratio is used to determine an organisation's liquidity and leverage ratios and provides interested parties and shareholders insight into the financial soundness of a bank.

2.9 Conclusion of Literature Review

The South African banking industry is under significant pressure to deliver competitive differentiation, customer lifetime value and shareholder profits. The industry is presented by a constant drive to capture revenue streams outside traditional lines of business and is forced to pivot towards Digital platforms, supplier collaboration, service integration and face. Despite the potential benefits of Digital Transformation, there is no clear approach to Digital Transformation, and South African banks are navigating the added challenges of legacy systems, and a highly regulated South African banking system.

The literature suggests that accounting measures of Business Performance can be used to produce a broad view of the operating activity of banks, inclusive of investment and operating expenditure related to Digital Transformation. In addition, the literature suggests that financial ratios may be applied in various

ways to derive insight into Business Performance, and remains silent on a standardized method of assessing the links between Digital Transformation and Business Performance (Sealey, C., and Lindley, J., 1977; Kaparakis, E., et al., 1994; Zaim, 1995).

Furthermore, the literature proposes an analysis of the Business Performance of Banks as being key for academic research, shareholders and organisational leadership. Lacobelli, A. (2017) alludes to empirical evidence having evidenced how the Business Performance of Banks is being influenced by organisational specific factors more than by macroeconomic variables (Lacobelli, A., 2017).

The literature also suggests the effects of Digital Maturity can be influenced in the ability to introduce operational efficiency through Digital Transformation, which can be measured through Business Performance indicators which measure bank-specific and macroeconomic factors on profitability, namely: liquidity ratios, efficiency ratios and profitability ratios (Antoun, R., Ali Coskun, A., Georgevski, B., 2018). This position is ideal for the purpose of the study, on the basis that Westerman's Leading Digital Framework (see Appendix - I and Appendix – J) features evidence of links between Digital Maturity and Business Performance, which can be assessed through a combination of the following Business Performance indicators: Revenue per employee; Fixed-Asset turnover, Earnings margins and Net-profit margin.

In conclusion, additional research is required to demonstrate the relationship between Digital Transformation and accounting measures of Business Performance. To address this gap, the study focusses on Business Performance indicators specified by Westerman, G., et al. (2014) as well as performance indicators that are common across the financial statements published by the South African-based banks that participated in the study. These performance indicators are deemed abundant for purpose of conducting financial analysis as well as exploring relationships between Digital Transformation and Business

Performance, through demonstration of the Westerman's Leading Digital Framework (see Appendix - I and Appendix – J).

2.9.1 *Research Objectives and Proposition*

Through the demonstration of Westerman's Leading Digital Framework (see Appendix - I and Appendix – J), this study makes use of dependent variables, being the measure of Business Performance, and independent variables, being the factors of Digital Maturity.

The study proposes to apply Westerman's Leading Digital Framework (see Appendix - I and Appendix – J) as well as other accounting measures of Business Performance, namely: CAR, CTIR, CLR, EBITM, FATR, NPM, RER, RoA and RoE, to explore relationships between Digital Transformation and Business Performance in South African-based banks. In addition, the study explored whether or not accounting measures of Business Performance is a proxy for Digital maturity in Banking.

The research objectives and proposition are listed below.

- RO-1: Whether or not there is a relationship between Digital maturity and accounting measures of Business Performance, namely, CAR, CTIR, CLR, EBITM, FATR, NPM, RER, RoA and RoE,
- RO-2: Whether or not accounting measures of Business Performance is a proxy for Digital maturity in Banking.
- Proposition: Whether or not Business Performance is a proxy for Digital maturity in Banking.

3 RESEARCH METHODOLOGY

A high-level illustration of the research methodology is presented in Appendix - H, with further details of the research methodology approach discussed below.

3.1 Research approach

This study is inductive and based upon literature, which supports the proposition that a relationship exists between Digital Transformation and Business Performance. The study follows a quantitative method design as set out below.

3.1.1 *Initial phase assessments: Data collection and Screening, and Digital Maturity assessment*

The initial phase involved collection of secondary data as well as primary data through the use of surveys, namely the Digital maturity assessment questionnaire (see Appendix - L).

Completed surveys relating to the financial period 2018/2019 underwent initial computation, to measure the level of Digital Maturity of banks. The initial computation was achieved by applying weightings to the survey scores before using averaging methods to calculate the mean Digital Maturity levels for each Bank. The survey results was mapped to a Cartesian-like plane for comparison, whereby Business Performance (dependent variables) was assessed against both “Digital Intensity” and “Transformation Management Intensity”, to produce the overall Digital Maturity (independent variables) according to Digital Enablement and Adoption or Digital Capability (Y-axis), and Leadership and Strategy or Leadership Capability (X-axis) (see Appendix – J). Organizations that rank high along both dimensions were mapped to the 1st quadrant (Digital Masters). Organizations that rank high along the X-axis but not the Y-axis were mapped to the 2nd quadrant (Conservatives). Organizations that rank highly

along the Y-axis but not the X-axis were mapped to the 3rd quadrant (Fashionistas). Organizations that rank low along the X-axis and Y-axis were mapped to the 4th quadrant (Beginners). These dimensions are underpinned by 9 factors, namely:

- Vision and Intent
- Culture and Engagement
- Governance and Organisation
- New value streams and Business models
- Innovation and Investment
- Customer orientation and Engagement
- Workforce enablement and Skills
- Operations and Core processes
- Technology and Data embeddedness

The secondary data of interest was obtained directly from publically available financial statements, specific to the financial period 2018/2019. The secondary data namely; CAR, CTIR, CLR, EBITM, FATR, NPM, RER, RoA and RoE, did not require computation.

3.1.2 *Final phase: Financial analysis of Business Performance indicators and Statistical data analysis*

The final phase made use of financial analysis. This was followed by validity and reliability testing and concluded by data analysis, mainly by means of various statistical techniques, in the exploration and investigating variables and their effect, relationships, and patterns as well as regression testing (Welman et al, 2005:211).

During this phase, dependent variables (Secondary data) was used as the measure of Business Performance or Business Performance indicators, with

independent variables (Primary data) being the factors of Digital Maturity. Validity of the secondary data was supported through the approach of using Business Performance indicators specified by Westerman, G., et al, (2014) and are also common amongst South African-based banks that had given permission to participate in the study.

The production of the secondary data (Business Performance indicators) is rigorously governed by under the rules of the General Accepted Accounting Principles (GAAP) and International Financial Reporting Standards (IFRS), and it is deemed the data is replicable and of high standard, thus presenting no concern on the reliability and validity of the study.

The analysis of Business Performance indicators was based on the 2018/2019 financial period, a time leading up to the Covid-19 pandemic. The Business Performance indicators were assessed for any obvious anomalies in the data. Whilst the South African banking industry players displayed a common trend towards physical branch closures during the 2018/2019 period, the publically available financial statements do not suggest unusual or noteworthy events, both internal and external to the participating banks, which may have significantly influenced the ability to operate in a business-as-usual manner.

Following data cleansing, Digital Maturity dataset (independent variables) and Business Performance indicators (dependent variables) was tested for normality across the independent and dependent variables. The dataset was then tested for probability distribution before exploring relationships amongst the Business Performance indicators and Digital Maturity using non-parametric techniques, regression testing. This approach was based upon the view that pragmatism is a superior approach to research, as it involved a combination of different methods to produce and explore an objective outcome (Howe, 1988 and Datta, 1994).

Testing for Normal distribution, the study made use of the non-parametric Shapiro-Wilk test (Shapiro, S., and Wilk. M., 1965), which suggests that data to have a normal distribution the data must produce a bell-shaped symmetrical curve nearest to the mean as well as the percentage of the data set must fall within standard deviations of the mean, ranging between -3 and +3 and whereby the mean is 0.

Testing of proposition used the observed data, to infer whether proposition presented by the study can be supported or rejected by empirical observation (Bhattacherjee, A., 2012). Inferential statistics was used for testing the proposition in the study with regards to the association on independent variables (Digital Maturity) and the dependent variables (Business Performance, namely: CAR, CTIR, CLR, EBITM, FATR, NPM, RER, RoA and RoE). Correlation analysis was used initially to examine the bivariate relationships among the constructs and the analysis of outputs, for identification of relevant information and exploring relationships (Verma, A., Yurov, K., Lane, L., and Yurova, Y., 2019).

3.2 Data collection methods and considerations towards research

This next section discusses the population, sampling methods and granular level details about the procedure for data collection, research instrument, pre-testing and piloting as well as validity and reliability of the study.

Data was collected from publically available sources such as; databases containing financial information about South African-based banks. Surveys were conducted with qualified persons employed by selected South African-based banks, with the aim of obtaining approximately 120 survey responses across a minimum of 6 South African-based banks.

3.2.1 *Population, sampling method and procedure for data collection*

The unit of analysis for this study was the South African Banking industry, the sample within this is the individual Banks.

For this quantitative methods study, the ideal population of South African-based banks to participate in the study was considered to be 2 large and 2 small banks as well as 2 Digital banks.

The sample is split between large banks, small banks, classified according to the number of employees as an indicator of bank size, and Digital banks where banking services are available through online banking channels and kiosks, without any physical banking branches (See Appendix – A). The ideal sample was based upon the industry, made up of South African-based banks the following banks in each size category.

The selection criterion was informed by the fact that the sample was required to be representative of all South African-based banks, where a non-probabilistic sampling method was used for sampling. The study then proceeded to engage the following South African-based banks.

3.2.1.1 *Large banks (Number of employees more than 10 000)*

- ABSA
- FNB
- Nedbank
- Standard Bank
- Capitec Bank

3.2.1.2 *Small banks (Number of employees less than 10 000)*

- African Bank (ABIL)
- Investec Bank
- UBank, formerly known as Teba Bank

3.2.1.3 *Digital Bank*

- Discovery Bank
- Bank Zero
- Tyme Bank

3.2.2 *Procedure for data collection*

Quantitative data analysis is performed using various methods ranging from basic univariate analysis to more complex multivariate analysis, namely: factor analysis, cluster analysis, multiple linear regression (Babbie, E., 2013; Wagner, B. B., and Garner, M. 2012).

The survey was initially administered via the Qualtrics online survey tool, unfortunately as Qultrics is an online tool prohibited by security features used by participating South African-based banks, the study then resolved to engaging mandated employees within the participating South African-based banks to distribute a Microsoft Excel version of the survey, embedded with the survey questions (see Appendix N for copy of the cover letter/invitation and Appendix I for copy of the survey questions) and included necessary details surrounding the study and steps to follow when completing the survey had been included. The mandated employees engaged the relevant Human Resources representatives to identify suitable candidates, before using e-mail to distribute the survey to approximately 5000 employees who met the criteria outlined in Section A and Section B of the research instrument. The questionnaire used in the study was standardised with pre-defined and close ended with a 7-point Likert scale; in order to maintain face and content validity.

The unit of analysis for this study was the South African Banking industry, the sample within this is the individual Banks. The selection criteria considered South African-based banks may have not been fully operational and / or may have experienced material changes, such as retrenchments, directorship, shareholder

and organisation-structure changes, during the period of interest, and thus the approach ensured purposeful sampling to generate a sample suitable of addressing the key research questions.

During the period of September-2020 and July-2021, a total of approximately 5000 requests were issued to South African-based banks over the period of 9 months, continually prompting and soliciting feedback throughout. The outcome resulted in only 3 banks agreeing to participate. Of the 3 banks, Bank A and Bank C are large banks, offering the following products and services across; corporate, retail and wealth banking as well as insurance and investment management to businesses and individuals. Bank B is a small bank, offering products and services comprising; retail, insurance and investment management.

Upon obtaining the approval from 3 banks, the relevant mechanisms and processes, internal to each of the participating banks, were followed to obtain responses from participants, whereby solicitation of responses was managed by the appointed internal representatives and conducted in accordance with the governance relevant to each participant bank. After a period of approximately 3 months had exhausted all efforts to obtain responses and it was deemed unable to expand participants and obtain further responses, the study proceeded to use non-parametric analysis to analyse the available data, under the premise that the 3 Banks are to be used as a representation of the South African Banking industry, and on this basis, the study assumed 29 observations as an adequate representation during a period such as the COVID-19 pandemic.

The data was then exported to Statistical Package for Social Scientists (SPSS) version 26 to perform statistical analysis, as SPSS is known for producing outputs that are easy to understand and interpret for purposes of research (Field, A., 2013). However, as SPSS could not be fully deployed on available computer devices, due to issues encountered with anti-virus and security policies, substitute online statistical analysis solutions had been used in conjunction, to verify the outputs of the limited deployment of SPSS, namely: Social Science Statistics and

Web-Enabled Scientific Services and Applications. The tools had been used collectively to test for replicability, consistency and integrity of each of the output produced during the descriptive statistics, used to illustrate the central tendency and distribution of the data. As the outputs across the tools had generally aligned, the final outputs were recorded from SPSS.

3.2.3 *The research instrument, pre-testing and pilot questionnaire*

A questionnaire survey designed to achieve the research objectives is deemed an intricate task (Bless, C., and Higson-Smith, C, 2000). Zikmund, W., Babin, B., Carr, J., and Griffin, M. (2013) suggest that successful questionnaire surveys must consider 3 standard considerations, namely: what questions are aligned to the objective, reliability of questions and validity of questions. These elements need to align to the overall research objectives and must be clear and avoid biases. In order to ensure the questions are understood, a pilot study was conducted to ensure the questions were easily understood and respondents could complete in the shortest possible time and the questionnaire needed to have content and face validity. Content validity was supported as the selection of the questionnaire items was based on previously validated questionnaire instruments.

Content validity was further assured through the process of pre-testing which is where fellow Wits Business School students of the Masters in Management in Digital Business were asked to comment on the questionnaire items (Bolarinwa, O.A. 2015). Face validity was driven through pilot testing where it was determined that the questionnaire items were considered easy to understand and meaningful (Bolarinwa, O.A. 2015).

The research instrument that was used in the study was an Microsoft Excel based self-administered questionnaire, this approach allowed for multiple questionnaires to be answered at the same time, as the assistance of an interviewer was not required (Bryman, A., 2012). This also enabled objectivity,

confidentiality and reduced social desirability as participants were able to read the questions and record the answers in an independent manner. According to Babbie, E. (2013) and Wagner, B. B., and Garner, M. (2012) there are a few self-administered questionnaires formats, including mail (postal) surveys; group-administered; and e-mail and internet surveys. Cooper, D.R., and Schindler, P.S. (2011) recommend that self-administered questionnaires, as was used, are efficient and allows for a broader geographical reach. The construction of the survey was based on objectives of the study (Zikmund, W., et al., 2013).

The research instrument was be split into 3 sections, namely:

- Sections A and Section B required participants to fill in their demographic information, English language proficiency and level of education, work experience in Banking, job function, understanding of Digital Maturity in Banking and had promoted respondents to ensure an understanding of Westerman's Leading Digital Framework (see Appendix - I and Appendix – J) prior to taking the survey. The purpose was to encourage respondents to obtain an understanding of Westerman's Leading Digital Framework (see Appendix - I and Appendix – J) prior to taking the survey as well as to identify respondents who are knowledgeable and capable of producing high-quality responses.
- Section C required participant to complete specific questions to produce an overall Digital Maturity, according to the following dimensions Digital Enablement and Adoption, and Leadership and Strategy. These dimensions are underpinned by 9 factors, namely: Vision and Intent, Culture and Engagement, Governance and Organisation, New value streams and Business models, Innovation and Investment, Customer orientation and Engagement, Workforce enablement and Skills, Operations and Core processes and Technology and Data embeddedness. The information collected assisted in providing a correlation between the sample and the general population, these questions were forced and closed-ended providing the participant with a

choice of a selection of predetermined answers. A 7-point Likert scale for Section C was utilized as it is an easy construct to use to evaluate both independent and dependent variables. The compilation of the instrument is formed by previous surveys and scales from past instances (Acedo, F.J., and Florin, J., 2006; Cools, E., and Van Der Broek, H., 2007). The survey was pre-tested by fellow Wits Business School students of the Masters in Management in Digital Business, this ensured there is clarity and no ambiguity in the questions.

The study used recognized and widely accepted accounting measures of Business Performance, namely: CAR, CTIR, CLR, EBITM, FATR, NPM, RER, RoA and RoE, to explore the existence of relationships with Digital Maturity, as assessed using the extended version of Westerman's Leading Digital Framework (see Appendix - I and Appendix – J). Business Performance was assessed against the "Digital Intensity" and "Transformation Management" Intensity dimensions of Digital Maturity, underpinned by 9 factors, namely:

- Governance and Organisation,
- Technology and Data Embeddedness,
- Vision and Intent,
- New Value Streams and Business Models,
- Investment and Innovation,
- Workforce Enablement and Skills
- Customer Orientation and Engagement
- Operations and Core Processes, and
- Culture and Engagement.

This framework illustrates truly exceptional Digital performers as being mapped to the upper-right boundary of the framework, while capable but imperfect performers are mapped to the bottom-right and upper-left quadrants. The lower-left quadrant is the domain of the Digital laggard.

Pre-testing is the assessment of the content validity of questionnaire. Hilton, C. (2015) suggests that pretesting is a method of validating that questions has the intended outcome and are clear and understood by participants. A pilot study determined the viability of the larger study. Hurst, S., Arulogun, O.S., Owalabi, A.O., Akinyemi, R., and Uvere, E. (2015) reaffirming that pilot testing comprised a simulation of the data.

Pre-testing involved sending the questionnaire in electronic format to fellow Wits Business School students of the Masters in Management in Digital Business who were asked to review and assess the questionnaire in order to ascertain if it was appropriate and acceptable.

Cooper, D.R., and Schindler, P.S. (2011) propose the use of a pilot study as a means highlighting flawed data collection. In addition, pilot testing supports assessment of the face validity of survey, as a result the pilot testing benefitted from a pilot study of 10 participants selected as a convenience sample from the researcher's professional network who are fellow Wits Business School students of the Masters in Management in Digital Business. The feedback was noted, and the questionnaire adjusted, namely: various questions were rephrased and made clearer and specific to the research objectives.

3.2.4 ***Validity, reliability, limitations and relationships in the data***

Validity and reliability pertains to understanding the logic and accuracy the measurement scales (Wilkins, 2010). Internal validity relates to the accuracy of the research instrument used. Cooper, D.R., Schindler, P.S., and Sun, J. (2006) suggest this type of measurement emphasizes whether the instrument consistently measures what it is meant to measure when repeated.

Whilst there are various types of reliability; inter-rater, test-retest, parallel forms and internal consistency, this study made use of internal consistency reliability as it generally used to measure the consistency of research instruments when collecting data of constructs under a quantitative study (Drost, E.A., 2011). Validity and reliability had been assessed using the primary data (independent variables) and secondary data (dependent variable) prior to application of statistical techniques for testing of the proposition. It is also generally accepted that the production of the secondary data of interest is rigorously governed by under the rules of the General Accepted Accounting Principles (GAAP) and International Financial Reporting Standards (IFRS), it is deemed the data is replicable and of high standard, thus presents no concern on the reliability and validity of the study. Notwithstanding the views on the governance of financial data, tests for validity had been performed using a combination of Kaiser-Meyer-Olkin (KMO) measure of Sampling Adequacy, Bartlett's Test of Spericity was conducted as part of factor analysis and to verify if the sample size was suitable for testing sampling adequacy across the dimensions of Digital Maturity and Business Performance indicators.

To provide a quantitative assessment of the amount of internal consistency across the specified items, Cronbach's alpha was used to test for internal consistency reliability and internal reliability, where it is generally accepted for the lower limit for Cronbach's alpha to be 0.7.

To analyse relationships between Digital maturity and Business Performance, namely: CAR, CTIR, CLR, EBITM, FATR, NPM, RER, RoA and RoE, assessments were performed using the following non-parametric data analysis techniques: non-parametric Shapiro-Wilk test (Shapiro, S., and Wilk. M., 1965) as well as Spearman Correlation analysis (Spearman, C., 2010) both applied for purpose of deriving an objective assessment of the strength of association between variables.

Thomas (2004) suggests that questioning as a data collection method is prone to being problematic as questions are generally interpreted in different ways by the participants. The instrument has not been tested for language barriers, this is relevant to this study, conducted in a very diverse and multi-cultural South Africa, which also boasts 11 official languages. Surveys are also subject to other possible limitations such as subconscious bias, a tendency of respondents to agree with statements and a tendency for respondents to answer questions in a way that is viewed as favourable to peers. To promote a sense of wellbeing, participants were requested to complete surveys with the highest level of integrity and with honesty, and were also reminded all responses will remain anonymous and that there were no correct or incorrect responses in the survey.

The COVID-19 pandemic could have a distorted the mind-set of respondents and there is a low chance of verifying if the aforementioned issues had an impact on the study, it is thus deemed that respondents had completed surveys in a manner that fair, credible and with integrity. The cross-sectional method used suggests that the data lacks temporal precedence and thus causal inferences have been avoided from the primary or secondary data.

In conclusion, the following key challenges and limitations affected the study:

- The study had only managed to obtain only 29 valid responses, from a total of approximately 5000 requests, over a 9 month period which had included continual prompting and soliciting feedback throughout the 9 month period. The researcher was limited to assume the 29 observations was an adequate representation during a period such as the COVID-19 pandemic.
- Digital Transformation are a closely kept strategic agenda amongst South African-based banks, resulting in limited insight into the existing Digital Technologies and capabilities within the value-chains of the participating businesses banks,
- The number of valid responses obtained from each of the participating banks had differed significantly. This was attributed to the different stages

at which the banks had been managing larger factors at play, namely: business strategy, and response to the COVID-19 pandemic. Thus attempting to compare the participating banks through a cross-case analysis would require a greater understanding of the impact of the COVID-19 pandemic.

- South African-based banks may have not been fully operational and / or may have experienced material changes, such as retrenchments, directorship, shareholder and organisation-structure changes, during the period of interest.
- The impact of the COVID-19 pandemic is not fully understood and its impact significantly sway the cognitive reasoning and lifestyles of respondents as well as limiting the availability of respondents and Banks. In addition, respondents are prohibited from disclosing certain information around Digital Transformation and business strategy, as a result of the COVID-19 pandemic.
- The impact of the COVID-19 pandemic continues to force industries and individuals to gravitate towards a work-from-home or remote-working business operating model, rather than an office-based operating model. Forcing a top-down organisational change that has directly influenced the investment towards Digital Transformation.
- Participating South African-based banks opted to remain anonymous.
- Whilst there exists a high number of accounting measures of Business Performance, this study focusses on CAR, CTIR, CLR, EBITM, FATR, NPM, RER, RoA and RoE, on the basis that these established accounting measures are widely used to measure Business Performance and are also aligned to Westerman's Leading Digital Framework (see Appendix - I and Appendix – J).

In conclusion, any causal inferences are made only with reference to underpinning theory used in development of the proposition and the inability to control all the confounding factors, such as business strategy and impact of the

COVID-19 pandemic, presents a threat to the internal validity of the study. The study made use of a non-probability sampling method and thus there is a systematic bias for external validity and generalisability of the study. As convenience sampling was utilized, on the basis that majority of South African-based banks are headquartered in the Johannesburg region, the outcome of surveys may not be a true reflection of the sample and the results would therefore be less generalizable to the South African banking industry. The nature of surveys suggests that a low response rate is acceptable and of a non-response bias, the resultant of the COVID-19 pandemic and rapid changes to business strategy are deemed to be the key larger factors that have further limited the generalizability of the results. Nonetheless, the intended target population has varying levels of age, gender, employment status, employment experience and education levels, relevant to Digital Transformation and will provide a useful set of results even if they are not representative of the broader consumer population.

3.3 Ethical considerations

Ethical clearance was obtained from Wits University before proceeding with the collection of information and data. Verified and reputable sources were used to obtain data and information, intended for use under this study, was collected from reputable sources. Data and information is stored securely for future reference. It was at all times disclosed that the study is performed under the mandate of Wits University.

4 PRESENTATION OF RESULTS

4.1 Introduction

This chapter summarises the presentation of results from the quantitative research obtained utilizing the assessment of primary and secondary data. All respondents were employees of South African-based banks and had opted to remain anonymous, as directed by their employers. A phased approach was followed, comprising an Initial phase and Final phase:

- The initial phase comprised data collection and screening of the survey results collected during September-2020 and July-2021, and followed by a Digital Maturity assessment. The survey results were mapped to a Cartesian-like plane for comparison, whereby Business Performance (dependent variables) was assessed against both “Digital Intensity” and “Transformation Management Intensity”, to produce the overall Maturity (dependent variables) according to Digital Enablement and Adoption or Digital Capability (Y-axis), and Leadership and Strategy or Leadership Capability (X-axis) (see Appendix – J).
- The final phase, comprised collection of secondary data (dependent variables), followed by inferential data analysis, whereby statistical data analysis was applied using non-parametric analysis. To analyse relationships between Digital maturity and Business Performance, namely: CAR, CTIR, CLR, EBITM, FATR, NPM, RER, RoA and RoE, assessments were performed using the following non-parametric data analysis techniques: non-parametric Shapiro-Wilk test (Shapiro, S., and Wilk. M., 1965) as well as Spearman Correlation analysis (Spearman, C., 2010) both applied for purpose of developing an objective assessment of the strength of association between variables.

The next section presents the overview and result for data screening results, sample characteristics. This is followed by the presentation of the results and finding pertaining to the Initial phase. The results and findings of the Final phase is then presented, followed by an analysis of results of the proposition tested.

4.1.1 *Initial phase assessments: Data collection and Screening, Digital Maturity assessment and Cost Efficiency assessment*

4.1.1.1 *Data collection and Screening*

This section of the study focuses on univariate analysis and makes use of primary data collected through means of a survey, completed by employees of participating South African-based banks. The purpose of this section is to qualify respondents for suitability to participate in the study, and therefore the screening considers surveys from Bank A, Bank B and Bank C. This type of analysis involved one variable at a time (Bryman, A., Bell, E., Hirschsohn, P., dos Santos, A., du Toit, J., Masenge, A., van Aardt, I. and Wagner, C., 2016:318). Microsoft Excel and its add-in program, PHStat, as well as SAS are used for data analysis, which is inclusive of creating frequency tables showing the frequency and percentages of each of the categories of the identified variables.

Pareto charts and histograms were also included, merely to aid in illustrations and the interpretation of quantitative data.

The unit of analysis for this study was the South African Banking industry, the sample within this is the individual Banks. The demographic profile of respondents required all respondents to be permanent employees of South African-based banks, have an English proficiency of Beginner or above, an education level of Diploma or above, as permanent employees in their current role for a period of no less than 4 years as well as greater than 5 years of work experience in Banking. In addition, respondents were required to have a theoretical understanding of the Westerman's Leading Digital Framework (see Appendix - I

and Appendix – J) before taking the survey and being able to contextualize Digital Maturity in Banking. Through coordinated efforts, approval was requested from 7 South African-based banks. However, approval was only granted by 3 banks, with all banks have requested to remain anonymous, and over a period of 9 calendar months, a total of approximately 500 requests were issued and prompted for feedback. Of the 3 banks, Bank A and Bank C are large banks, offering the following products and services across; corporate, retail and wealth banking as well as insurance and investment management to businesses and individuals. Bank B is a small bank, offering products and services comprising; retail, insurance and investment management. On this basis, the available data for Business Performance was assumed to be ideal and the data was normalized where required as well as the Financial Performance indicators are based upon standardized ratios, for comparing quantities and proportions.

The Covid-19 pandemic presented unavoidable challenges seen in the data screening, whereby the study had been limited in its continuous application of acceptable methods of encouragement of Banks to participate in the study and the obtaining of additional survey responses from participating banks. Data screening also highlighted how challenges were compounded by the difficulty of obtaining survey responses without introducing safety concerns or compelling respondents to prioritize participation during the Covid-19 pandemic.

As a result, a total of 50 responses were received, 3 of these were excluded due to missing or incomplete data. The initial section of the survey comprises respondent-qualifier questions, using multiple-choice questions to ascertain the respondents: age, English language proficiency, level of education, work experience in Banking, job function, theoretical understanding of the Westerman's Leading Digital Framework (see Appendix - I and Appendix – J) and ability to contextualize Digital Maturity in Banking.

Data screening also revealed that 18 responses were required to be excluded from the analysis as the responses failed any number of the qualifying questions

from Qualifier 2 through to Qualifier 7 (see Appendix – I). As a result, there were 29 observations from 3 South African-based banks, which are also considered to be an inadequate sample size for meaningful data analysis.

Nevertheless, the study proceeded to use non-parametric analysis to analyse the available data, under the premise that the 3 Banks are to be used as a representation of the South African Banking industry, and on this basis, the study assumed 29 observations as an adequate representation.

4.1.1.2 *Respondents Demographic Profile*

4.1.1.2.1 Gender

Survey respondents were asked to indicate their gender, as either; male, female or unspecified. Table 1 shows the respondent's gender distribution. The results show 59% of respondents as being female with 38% male and 3% unspecified.

Table 1: Survey Respondents Gender

Gender		
Gender	Frequency	Percentage
Male	11	38%
Female	17	59%
Unspecified	1	3%
Total	29	100%

Source: Primary Data

4.1.1.2.2 Age Group

Table 2 shows that majority of the respondents are aged 31- 45 (49%), followed by those in the age group 16 – 30 (41%). The age group of 46 – 60 and 60+ were the 7% and 3% respectively. This result suggests there must be a focus of the older generation on Digital studies in the future to better understand the group's Digital skills and Digital financial services use.

Table 2: Survey Respondents Age Group

Age Group			
Age	Frequency	Percentage	Cumulative Percentage
16-30	12	41%	41%
31-45	14	48%	90%
46-60	2	7%	97%
60+	1	3%	100%
Total	29		

Source: Primary Data

4.1.1.2.3 English Language proficiency

Table 3 illustrates the results for English proficiency indicates 87% of respondents have Advanced English language proficiency, followed by 10% of respondents with Intermediate English language proficiency and a cumulative 3% respondents with Beginner and No basic proficiency. Results suggest a high number of respondents have Advanced levels of English language proficiency.

Table 3: Survey Respondents English Language proficiency

English Language Proficiency				
	Frequency	Percent	Valid Percent	Cumulative Percent
No basic knowledge	0	0%	0%	0%
Beginner	1	3%	5%	5%
Intermediate	3	10%	18%	23%
Advanced	25	87%	77%	100%
Total			100%	

Source: Primary Data

4.1.1.2.4 Highest Education Level

Table 4 shows the distribution of the results from the survey. The respondent's education levels had ranged from No Matric to Doctoral degree. A small number of the population have Diploma (3%), whilst 52% are those with a Bachelor's degree, 28% have Honours/Post Graduate degree, 14% have a Master's degree and 3% have a Doctoral degree. This result reflects that data was collected among a population with a reasonably high level of education.

Table 4: Survey Respondents Highest Level of Education

Highest Education Levels				
	Frequency	Percent	Valid Percent	Cumulative Percent
No Matric	0	0%	0%	0%
Matric	0	0%	0%	0%
Diploma	1	3%	4%	3%
Bachelor's Degree	15	52%	38%	55%
Honors/Post Graduate Degree	8	28%	30%	83%
Master's Degree	4	14%	5%	96%
Doctoral Degree	1	3%	1%	100%

Source: Primary Data

4.1.1.2.1 Work Experience in Banking and current Job function

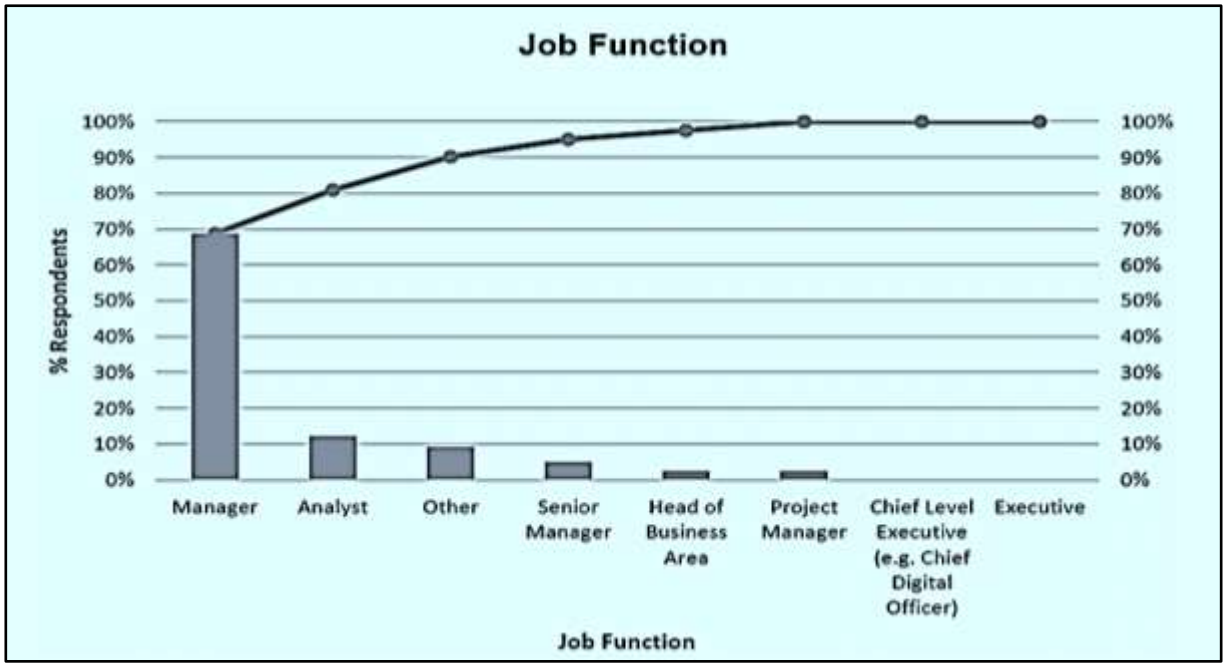
Table 5 shows the distribution of work experience results from the survey. The respondent's work experience in Banking had ranged from 0 years to 20+. A small number of the population have 0-5 years of experience (0%), whilst 7% are those with 6-10 years of experience, 41% have 11-15 years of experience, 34% have 16-20 years and 17% have 20 or more years of experience. This result reflects that data was collected among a population with extensive experience in the Banking industry and able to comprehend and contextualize the relevance of

Digital Maturity to the Banking industry. The Pareto chart (see Figure 2) illustrates an aggregated view of the respondents' job functions across all participating Banks and shows the frequency of occurrence along with the cumulative percentage of the aggregate amount of occurrences of the level of a category variable (XLSTAT, n.d.). An interesting observation can be made on the significant number of respondents who operate as managers (69%) against the total respondents, as well as 12% of respondents who identified their job function as closely aligned to that of an analyst type job function – These job functions total approximately 80% of total respondents who qualify the screening.

Table 5: Survey Respondents Work Experience

Work Experience in Banking			
Years	Frequency	Percent	Cumulative Percent
0-5	0	0%	0%
6-10	2	7%	7%
11-15	12	41%	48%
16-20	10	34%	82%
20+	5	17%	100%

Source: Primary data



Source: Primary data

Figure 2: Job Function

4.1.1.3 *Understanding of Digital Maturity in Banking*

Table 6 shows the results for Digital Maturity in Banking, 65% of respondents have theoretically researched Westerman's Leading Digital Framework (see Appendix - I and Appendix – J) before taking the survey as well as share prior working experience in Digital Maturity and can contextualize Digital Maturity in Banking, followed by 35% of respondents theoretically researched Westerman's Leading Digital Framework (see Appendix - I and Appendix – J) before taking the survey and can contextualize Digital Maturity in Banking. All respondents have an understanding of Digital Maturity in Banking and / or have performed theoretical research on the topic before undertaking the survey.

Table 6: Survey Respondents Understanding of Digital Maturity in Banking

Understanding of Digital Maturity in Banking				
	Frequency	Percent	Valid Percent	Cumulative Percent
I have no understanding of Digital Maturity and its relevance to Banking	0	0%	0%	0%
I have theoretically researched George Westerman's Leading Digital Framework prior to taking the survey and am able to contextualize Digital Maturity in Banking	10	35%	30%	35%
I have theoretically researched George Westerman's Leading Digital Framework prior to taking the survey as well as share prior working experience in Digital Maturity. I am also able to contextualize Digital Maturity in Banking	19	65%	60%	100%
Total			100%	

Source: Primary Data

4.1.1.4 *Digital Maturity assessment*

A measure of central tendency is employed in performing analysis of the results of overall Digital Maturity, as represented by Digital Enablement and Adoption as well as Leadership and Strategy. This measure refers to a distinct value that is used to describe a particular set of data by identifying a central position within that set (Laerd Statistics, 2018).

Primary data was collected through means of a questionnaire, used to measure the Digital Maturity of South African-based banks. In addition, secondary data for participating banks were collected from public sources. Availability of secondary data considered the 3 South African-based banks which agreed to participate in the questionnaire, the inputs and outputs for each of the selected banks.

Digital Maturity was assessed using a diversity of question styles across 49 questions, including 7-point Likert-type scales and multiple-choice questions, whereby weightings were applied to the survey scores before using measures of central tendency namely the median and the mode methods to calculate the mean Digital Maturity levels for each Bank.

The survey results were mapped to a Cartesian-like plane for comparison (see Figure 3). Business Performance was assessed against both “Digital Intensity” and “Transformation Management Intensity”, to establish the overall Digital Maturity according to Digital Enablement and Adoption, and Leadership and Strategy. These dimensions are underpinned by 9 factors, namely:

- Vision and Intent
- Culture and Engagement
- Governance and Organisation
- New value streams and Business models
- Innovation and Investment
- Customer orientation and Engagement
- Workforce enablement and Skills
- Operations and Core processes
- Technology and Data embeddedness

4.1.1.4.1 Overall Digital Maturity

As illustrated by Table 7, the overall Digital Maturity, as measured by Digital Enablement and Adoption and Leadership and Strategy produced the following scores. Median scores across all Banks as Digital Enablement and Adoption (35%) and Leadership and Strategy (48.5%).

The combined use of Table 7, Table 9 and Appendix – K.1 to Appendix – K.9 provides an overview of the scores across these 9 factors as well as Figure 3.a

illustrates the Digital Maturity summaries plotted against the Cartesian-like plane. As the scores across all 9 factors is not the main topic of discussion, the discussion of these scores will be placed under the appendix section and key information and scores rather discussed under the presentation of results.

The overall Digital Maturity according to results for Digital Enablement and Adoption is as follows: Bank A 28.27%, Bank B 34.23% and Bank C 38.43%. Boxplots illustrate the following: 23% (Minimum), 27.5% (First Quartile), 33.64% (Median), 40.5% (Third Quartile) and 68% (Maximum) - see Table 7.

The overall Leadership and Strategy are as follows: Bank A 44.44%, Bank B 56.04% and Bank C 69.98%. Boxplot illustrate the following: 4% (Minimum), 33.5% (First Quartile), 48.5% (Median), 61.5% (Third Quartile) and 98% (Maximum) - see Table 7.

The overall Digital Maturity according to results for Digital Enablement and Adoption and Leadership and Strategy plotted on the Westerman Leading Digital Framework (see Appendix - I and Appendix – J) illustrates: Bank A plotted to the quadrant for Beginners as well as Bank B, and with Bank C being plotted to the quadrant for Fashionistas. The characteristics of these quadrants are listed below:

- Beginners: Management sceptical of the business value of advanced digital technologies along with some experimentation and marred by an immature Digital culture.

- Fashionistas: Characteristics of advanced Digital features deployed in silos as well as no over-arching Digital vision, undeveloped coordination and a siloed Digital culture.

When assessing the unpinning factors it is worth noting the scores across the Banks are reasonably aligned. The scores which are not reasonably aligned are the scores for Innovation and Investment are significantly higher for Bank B (80%) and Bank C (86.7%) compared to Bank A (35.7%) as well as the scores for Operations and Core Processes with scores as follows; Bank B (37.8%), Bank C (39.6%) significantly higher than Bank A (28.3%). Seemingly when examining the overall scores for Digital Maturity to Business Performance indicators, FATR for Bank B (18.915%) and Bank C (7.722%) is lower than Bank A (23.286%), possibly the only observation suggesting a high focus on underlying factors of Investment and Innovation as well as Operations and Core Processes is more likely to affect the overall Digital Maturity scores than that of other underlying factors. However, in support of Westerman's Leading Digital Framework (see Appendix - I and Appendix – J), it is observed that Bank B reported higher profitability ratios compared to Bank A and Bank C, focusing on EBIT and NPM, where amounts are reported as; EBIT Bank A (30.153), Bank B (42.473) and Bank C (16.492) as well as NPM Bank A (22.262), Bank B (31.283) and Bank C (14.921) - see Figure 3c. This observation is further substantiated considering the much higher CAR for Bank B (38.5%) compared to Bank A (16.5%) and Bank C (15.2%).

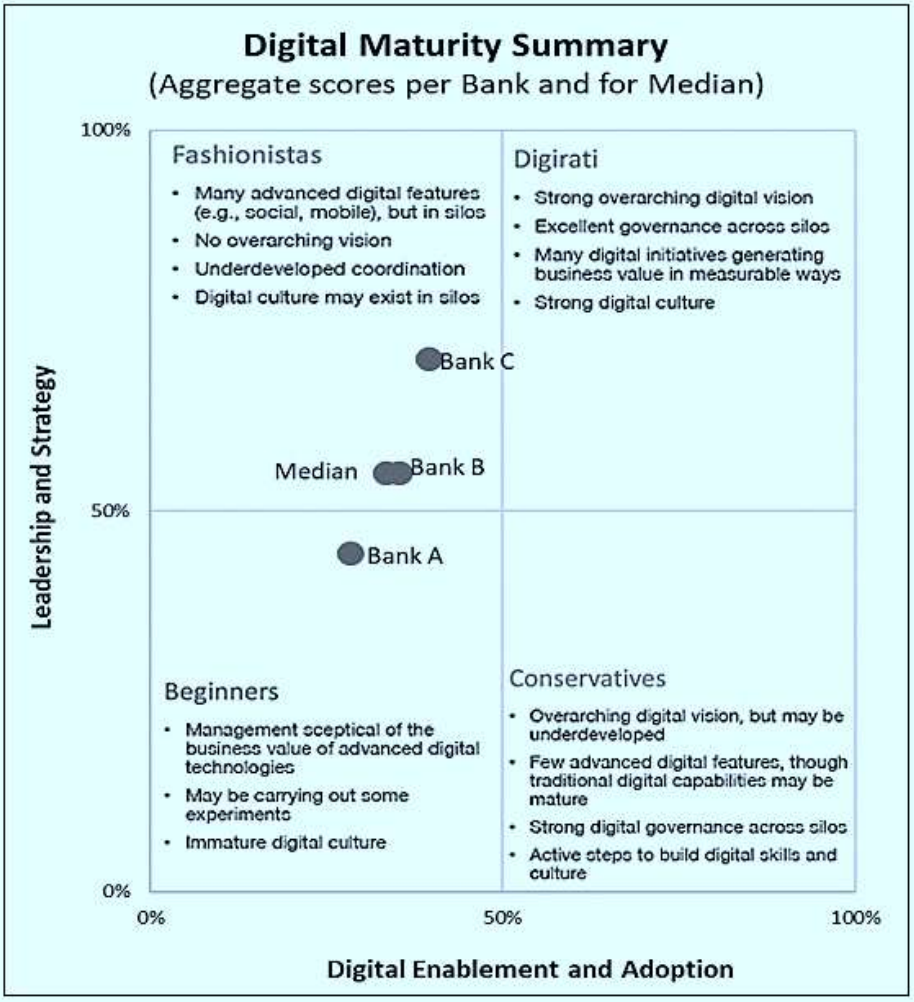
When taking into account the limitation on the available data, it must be resolved that more research is required to substantiate these striking observations.

Table 7: Digital Maturity Assessment Overview

Digital Maturity Assessment Overview				
	Bank A	Bank B	Bank C	Median
Number of responses	14	5	10	29
Vision and Intent	43.2%	55.0%	64.3%	52.5%
Culture and Engagement	38.4%	51.3%	53.6%	45.9%
Governance and Organisation	44.1%	53.8%	57.4%	40.3%

New Value Streams and Business Models	60.8%	40.0%	88.0%	66.6%
Innovation and Investment	35.7%	80.0%	86.7%	60.9%
Customer Orientation and Engagement	38.7%	43.0%	54.4%	44.9%
Workforce enablement and skills	42.0%	48.1%	52.9%	46.8%
Operations and Core Processes	28.3%	37.8%	39.6%	33.8%
Technology and Data Embeddedness	32.4%	42.2%	45.3%	38.5%
Digital Enablement and Adoption	28%	34%	38%	35%
Leadership and Strategy	44%	56%	70%	48.5%

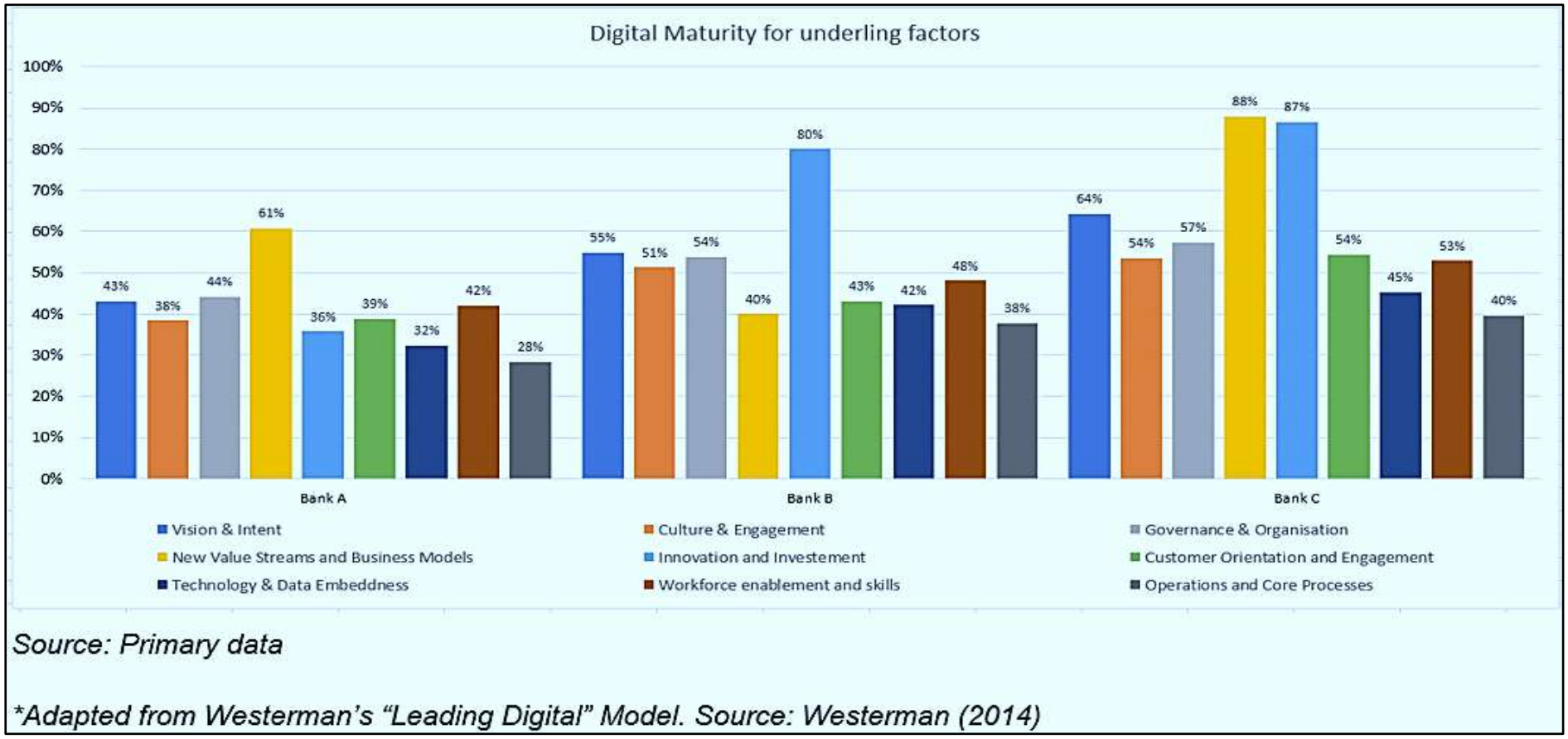
Source: Primary data with Median derived from Authors calculations



Source: Primary data

**Adapted from Westerman's "Leading Digital" Model. Source: Westerman (2014)*

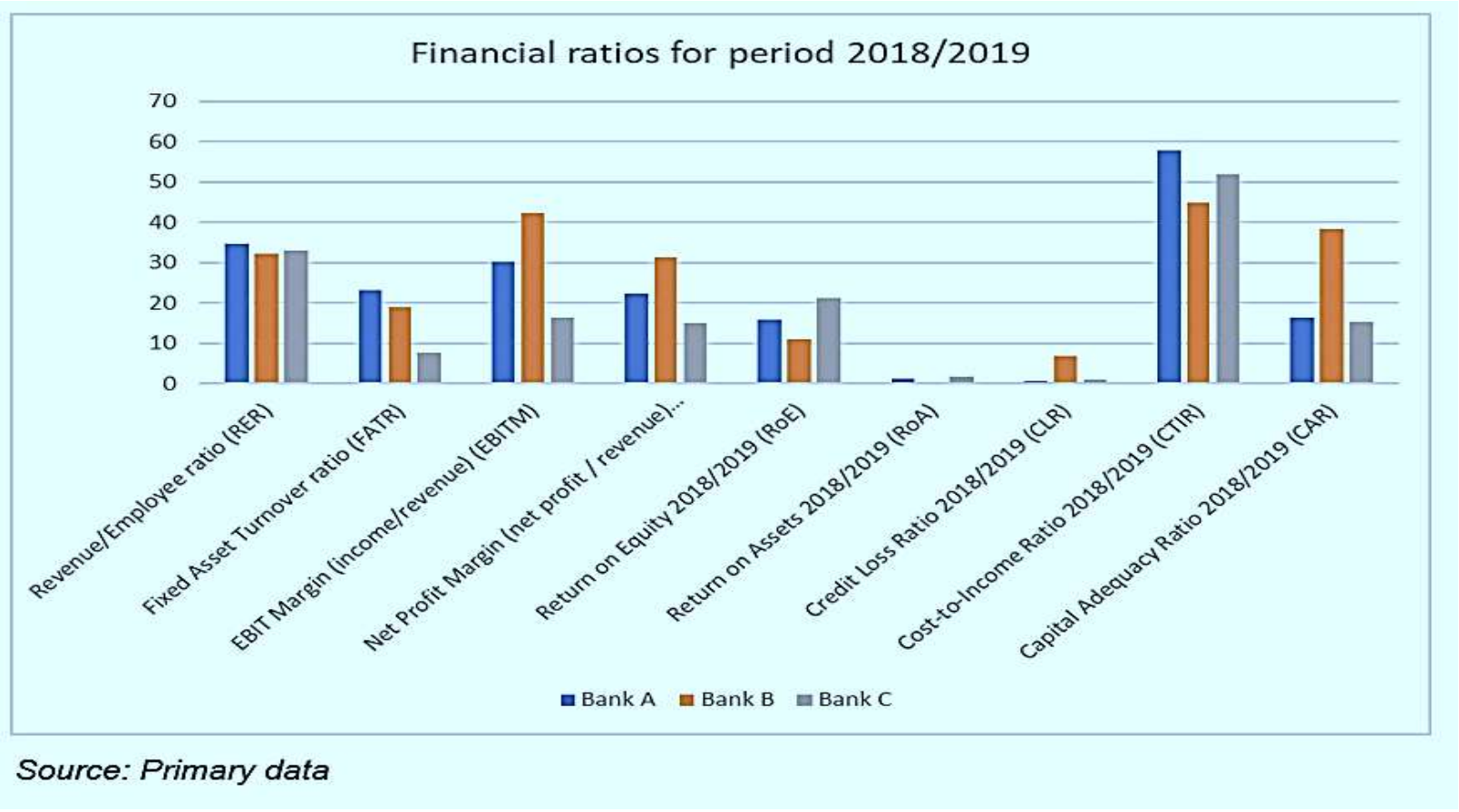
Figure 3a: Digital Maturity Summary



Source: Primary data

**Adapted from Westerman's "Leading Digital" Model. Source: Westerman (2014)*

Figure 3b: Digital Maturity for underlying factors



Source: Primary data

Figure 3c: Business Performance indicators for Period 2018/2019

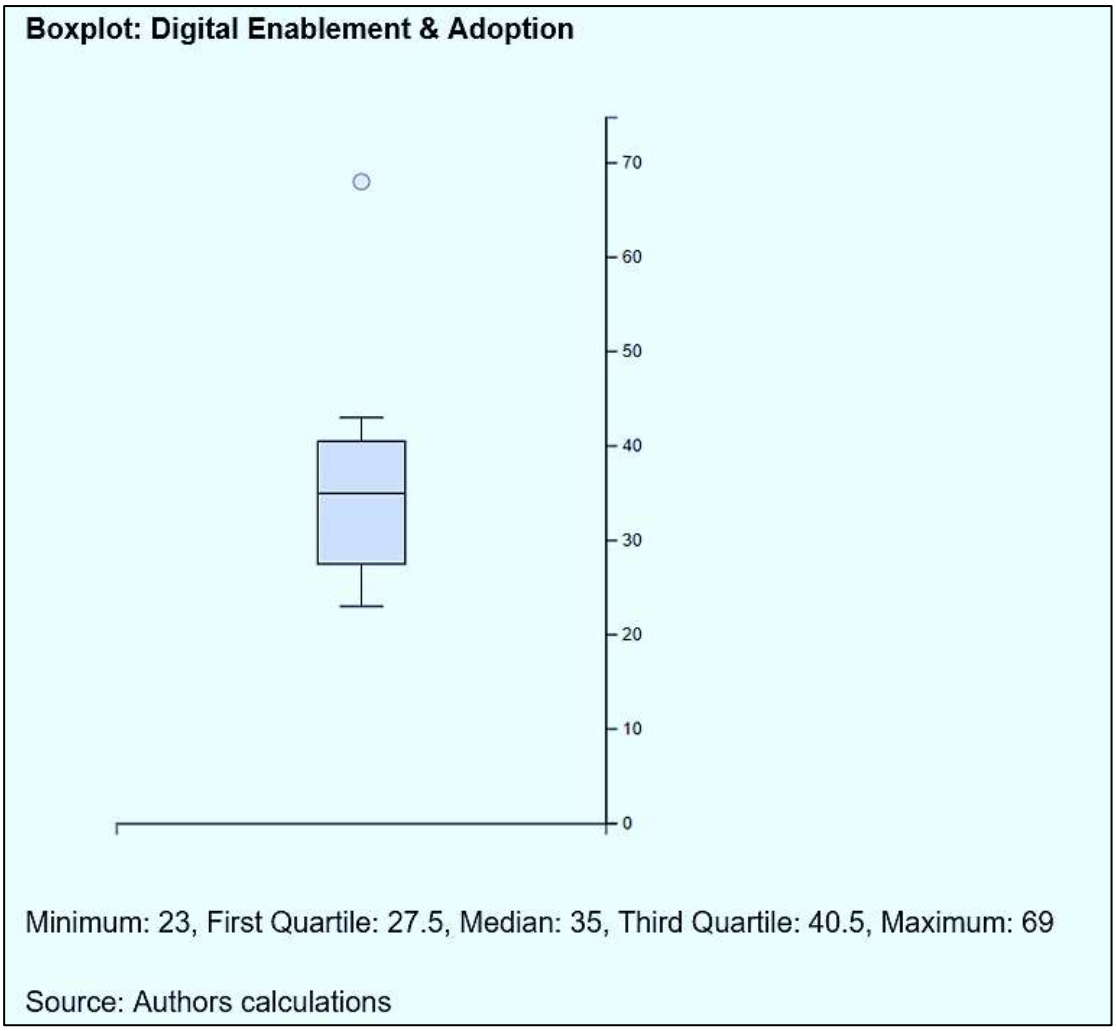


Figure 3d: Boxplot: Digital Enablement and Adoption

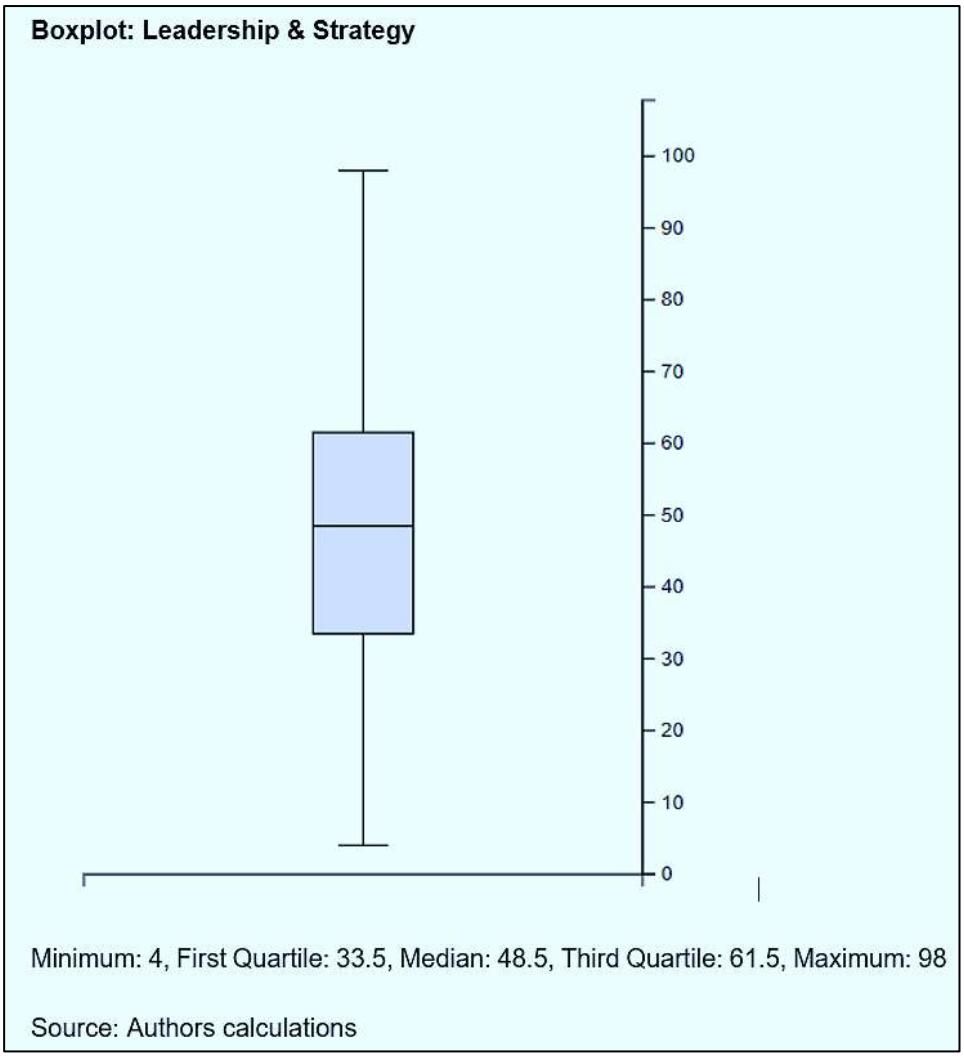


Figure 3e: Boxplot: Leadership and Strategy

4.1.2 *Final phase: Financial analysis of Business Performance indicators and Statistical analysis*

The next section of the study discusses the use of a combination of statistical tests performed as part of factor analysis and to assess validity and reliability, verifying if the sample size was suitable for testing sampling adequacy, namely: Kaiser-Meyer-Olkin (KMO) measure of Sampling Adequacy, Bartlett's Test of Spericity. It then discusses Digital Maturity (independent variables) and the dependent variables, being the accounting measures of Business Performance, namely: CAR, CTIR, CLR, EBITM, FATR, NPM, RER, RoA and RoE, for the purpose testing for normality across the dependent and independent variables. The dataset was then tested for probability distribution before exploring relationships amongst the Business Performance indicators and Digital Maturity using non-parametric techniques, as well as the study explored whether or not accounting measures of Business Performance is a proxy for Digital maturity in Banking.

4.1.2.1 *Research Objectives and Proposition:*

- RO-1: Whether or not there is a relationship between Digital maturity and accounting measures of Business Performance, namely: CAR, CTIR, CLR, EBITM, FATR, NPM, RER, RoA and RoE.
- RO-2: Whether or not accounting measures of Business Performance is a proxy for Digital maturity in Banking.
- Proposition: Whether or not Business Performance is a proxy for Digital transformation in banks.

4.1.2.2 *Validity and Reliability Statistics*

Testing for validity had been conducted using a combination of Kaiser-Meyer-Olkin (KMO) measure of Sampling Adequacy and Bartlett's Test of Spericity, as part of factor analysis and to verify if the sample size was suitable for testing

sampling adequacy across the dimensions of Digital Maturity and Business Performance indicators. The KMO measure (0.168) was significantly lower than the acceptable limit of 0.500, and the Barlett's Test result of 0.093054 is above the acceptable limit of 0.05, thus highlighting issues previously stated around the data sample and supporting the limitations on obtaining sensitive data during a period such as the COVID-19 pandemic. Still, the study proceeded on the basis that the data sample was acceptable during a period such as the COVID-19 pandemic and all efforts had been exhausted in trying to obtain further samples during the 9 month data collection period. Thus Cronbach's alpha was used to, where it is generally accepted for the lower limit for Cronbach's alpha to be 0.7, The results for Cronbach's alpha, on all items, was above the lower limit of 0.7, thus producing evidence of internal consistency reliability and internal reliability (see Figure 3d and Table 8).

Sampling Adequacy		
KMO		
	p-value	0.168
Bartlett's Test		
	Statistic B Score	0.093054
	p-value	0

Source: Authors Calculations

Figure 3d: Sampling Adequacy: KMO and Barlett's Test

Table 8: Observations used for statistical analysis, Confidence Interval Testing and sampling of Business Performance indicators for financial periods 2018/2019

Cronbach's Alpha: Business Performance indicators				
Items	Cronbach Alpha	Std. Alpha	G6(smc)	Average R
All itmes	0.9261	0.9333	0.9067	0.8235
Bank A	0.8662	0.878	0.7825	0.7825
Bank B	0.906	0.9202	0.8522	0.8522
Bank C	0.9105	0.9106	0.8358	0.8358

Source: Authors Calculations

4.1.2.3 *Analysis of Business Performance indicators*

The analysis of Business Performance indicators is based on the 2018/2019 financial period, a time prior to the Covid-19 pandemic. Whilst the South African banking industry players displayed a common trend towards physical branch closures, during the 2018/2019 period the publically available financial statements do not suggest unusual or noteworthy events, both internal and external to the organisations, which may have significantly influenced the ability to operate in a business-as-usual manner. In addition, the events which had resulted in a general impact on the South African economy whereas a result of a resurgence of load-shedding associated with the energy utility Eskom, an apparent increasing trend in geopolitical tensions, and low confidence in accordance with the "Junk" status published by Moody's and Fitch major rating agencies, resulting in increased cost of lending from foreign markets. This next section discusses the Business Performance indicators for each of the participating banks.

A visual representation of the correlation amongst Business Performance indicators suggests Bank A and Bank C are generally aligned in their

performance, whilst Bank C is not (see Figure 4a). This is expected, as Bank A and Bank C are large banks, offering products and services comprising; corporate, retail and wealth banking as well as insurance and investment management to businesses and individuals. Bank B is a small bank, offering products and services including; retail, insurance and investment management. The inconsistent nature of Business Performance measures undermines the ability to demonstrate association between Digital Maturity, the Leading Digital Framework suggests organisations with enhanced overall Digital Maturity scores is one which is able to generate higher levels of revenue with the least number of resources, which is expected to be evident in the Business Performance indicators. The next section unpacks Business Performance indicators (Table 9) and compares these to overall Digital Maturity scores (Table 7).

1. RER is often used when determining efficiency and profitability ratios. The Revenue per employee ratio provides an indication of how much income each employee generates for an organisation. The ratio merely divides total revenue generated by the total number of employees, an organisation with a higher RER demonstrates a superior ability to generate revenue. The RER for Bank A is R2,078,420.67 per employee represented as 34.657% of the total RER across all participating banks, with Bank B being R1,929,212.79 per employee represented as 32.169% of the total RER across all participating banks and Bank C is R1,989,449.31 represented as 33.174% of the total RER across all participating banks. For purpose of data analysis, as the value for RER was much higher than other values, the value for RER was normalized using STANDARDIZE function within Microsoft Excel (see Appendix – M and below 4b and Figure 4c). The results for RER indicate that Bank A was able to generate a higher rate of return per employee than Bank B and Bank C. Given the issues with available data, Bank A managed to generate a higher rate of return per employee when compared to Bank B and Bank C. This observation is

noteworthy considering Bank A obtained lower overall Digital Maturity scores to that of Bank B and Bank C.

2. FATR is generally used during the assessment of organisational efficiency and profitability, providing insight into the ability of an organisation to generate net sales from fixed-asset investments. FATR is assessed by dividing net sales by fixed assets. An organisation with a higher FATR demonstrates a management capability able to use fixed-assets more efficiently. Bank A produced a FATR of 23.286%, followed by Bank C (12.95%) and Bank B (5.29%). In addition, the major difference in the performance between Bank A and Bank C, where Bank A (23.286) is much higher than Bank C (7.722). Whilst Bank A obtained a high FATR, it also obtained lowest overall Digital Maturity scores and suggests a poor correlation between Digital Maturity and Business Performance. Worth noting is how South African-based banks closed an average of 21% physical branches during the 2017/2018 financial period. Whilst many branches closed were not fully owned, it is worth mentioning Bank A and Bank C had not seen a change in fixed assets greater than 1% during the 2018/2019 as well as the previous 4 financial periods. This observation is indicative of the increasing trend towards the closure of physical branches. This is observation is aligned with McKinsey's (2019) prediction of 30% - 50% of retail transactions migrating to online by the year 2025.
3. EBITM provides a view of an organisation's profitability as a percentage of revenues. EBIT is assessed by dividing operating income by revenue or sales. An organisation with a higher EBITM than other industry players usually demonstrates an enhanced ability to generate revenue. Bank A recorded an EBITM of 30%, with Bank B (42.473%) and Bank C (16.492%). The results for EBITM are not aligned to the overall scores for Digital Maturity, namely the rankings for overall Digital Maturity saw Bank B (34.23% for Digital Enablement and Adoption, and 56.04% for Leadership and Strategy) with the highest scores, followed by Bank C

(38.43% for Digital Enablement and Adoption, and 69.98% for Leadership and Strategy) and Bank A (28.27% for Digital Enablement and Adoption, and 44.44% for Leadership and Strategy).

4. NPM produces an indication of the remaining profit after all costs of production, administration, and financing have been deducted from sales, and income taxes recognized. Organisations with a higher NPM to other industry players illustrates a greater ability to generate profits. Bank A reported a NPM of 0.22 or 22%, with Bank B (0.31 or 31%) and Bank C (0.15 or 15%). Whilst Bank B scored the highest, followed by Bank A and Bank C, the results for NPM are not aligned to the overall scores for Digital Maturity, namely the rankings for overall Digital Maturity saw Bank B (34.23% for Digital Enablement and Adoption, and 56.04% for Leadership and Strategy) with the highest scores, followed by Bank C (38.43% for Digital Enablement and Adoption, and 69.98% for Leadership and Strategy) and Bank A (28.27% for Digital Enablement and Adoption, and 44.44% for Leadership and Strategy).
5. RoE refers to how much profit a company earned compared to the total amount of shareholder equity invested. A business that has a high return on equity is more likely to be one that is capable of generating cash internally. Organisations with a higher RoE than other industry players indicates a superior ability to generate profits in relation to equity. Bank A recorded a RoE of 15.8 or 30%, with Bank B (0.42 or 42%) and Bank C (0.16 or 16%). As Bank B scored the highest for RoE, followed by Bank C and then Bank A, the results for RoE are aligned to the overall scores for Digital Maturity, namely the rankings for overall Digital Maturity saw Bank B (34.23% for Digital Enablement and Adoption, and 56.04% for Leadership and Strategy) with the highest scores, followed by Bank C (38.43% for Digital Enablement and Adoption, and 69.98% for Leadership and Strategy) and Bank A (28.27% for Digital Enablement and Adoption, and 44.44% for Leadership and Strategy).

6. RoA is used to illustrate the financial performance of an organisation. ROA is the net income for the year divided by total assets and measures the ability of the bank management to generate income by utilizing company assets at their disposal. It further indicates the efficiency of the management of a company in generating a net income from its resources. A higher RoA to other industry players indicates an enhanced ability to generate profits in relation to assets. Bank A recorded a RoA of 1.20 or 1.2%, with Bank B (0.5 or 0.5%) and Bank C (1.74 or 1.74%). Since Bank C scored the highest for RoA, followed by Bank A and then Bank B, the results for RoA are not aligned to the overall scores for Digital Maturity, namely the rankings for overall Digital Maturity saw Bank B (34.23% for Digital Enablement and Adoption, and 56.04% for Leadership and Strategy) with the highest scores, followed by Bank C (38.43% for Digital Enablement and Adoption, and 69.98% for Leadership and Strategy) and Bank A (28.27% for Digital Enablement and Adoption, and 44.44% for Leadership and Strategy).
7. CLR is used by financial institutions that sell mortgage-backed securities and is considered during the assessment of liquidity and leverage ratios. Credit Loss ratios provide insight into the risk assumed by a financial institution. Credit Loss ratio is assessed by dividing impairment losses into loans and advances by total average advances. Organisations with a lower CLR to other industry players indicates a low appetite risk and a high appetite for the avoidance of losses through high-risk financial products. Bank A recorded a CLR of 0.73%, with Bank B (6.90%) and Bank C (0.88%). The results for CLR are rather sporadic and whilst Bank B scored much higher than Bank B and the lowest score is to Bank A, when considering where each Bank has placed in rank, the scores for CLR are aligned to the overall scores for Digital Maturity, namely the rankings for overall Digital Maturity saw Bank B (34.23% for Digital Enablement and Adoption, and 56.04% for Leadership and Strategy) with the highest

scores, followed by Bank C (38.43% for Digital Enablement and Adoption, and 69.98% for Leadership and Strategy) and Bank A (28.27% for Digital Enablement and Adoption, and 44.44% for Leadership and Strategy). The significant disparity does not align to the difference in overall Digital Maturity scores.

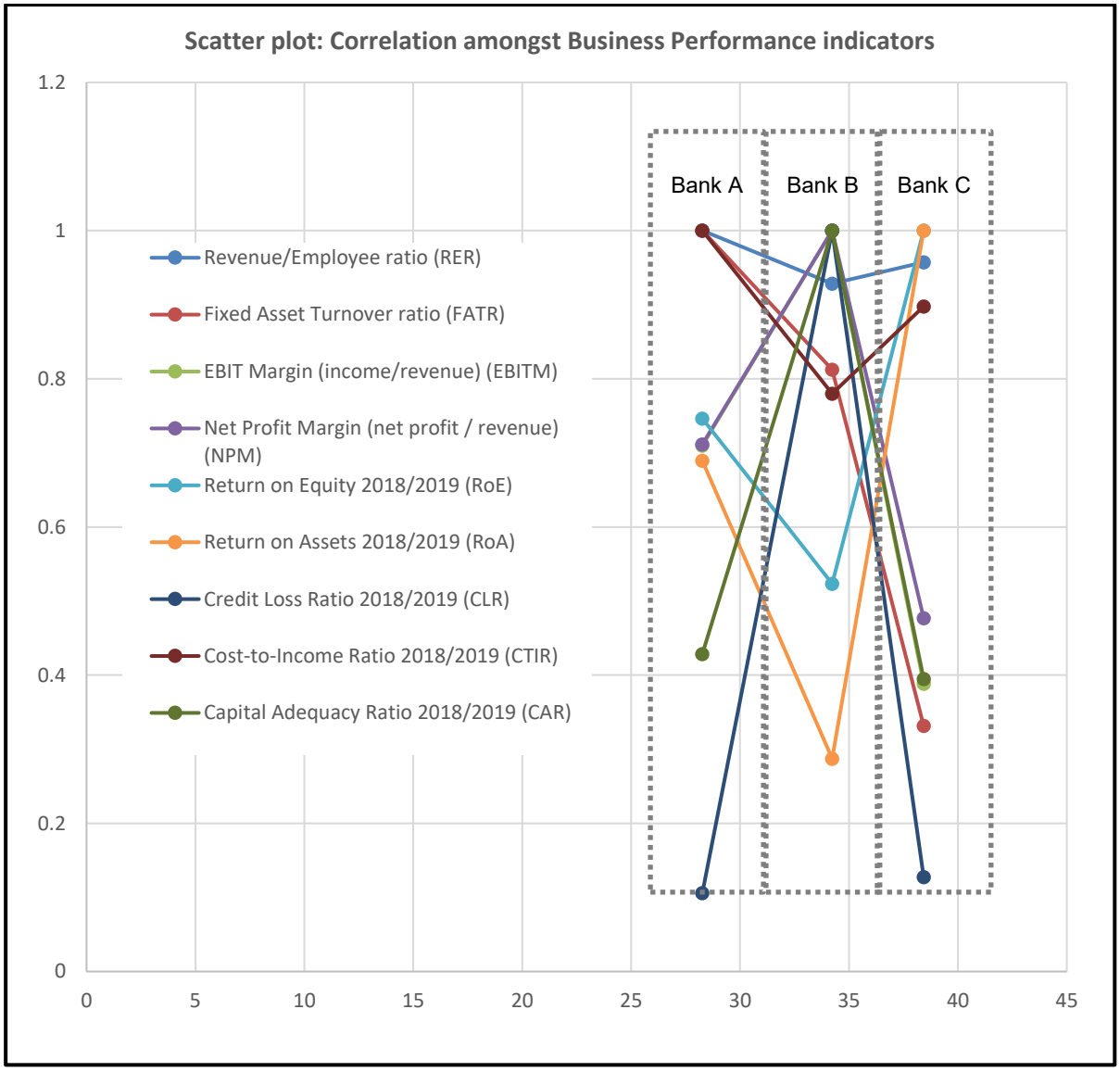
8. CTIR is assessed by dividing operating costs by operating income and is used to determine the value of an organisation relative to liquidity, profitability and efficiency. Organisations with a lower CTIR to other industry players indicates an increased ability to generate profits. Bank A recorded a CTIR of 57.70%, with Bank B (45.00%) and Bank C (51.80%). Since Bank A had the highest CTIR, followed by Bank C and then Bank B, these results indicate CTIR is not aligned to the overall scores for Digital Maturity, namely the rankings for overall Digital Maturity saw Bank B (34.23% for Digital Enablement and Adoption, and 56.04% for Leadership and Strategy) with the lowest scores, followed by Bank C (38.43% for Digital Enablement and Adoption, and 69.98% for Leadership and Strategy) and Bank A (28.27% for Digital Enablement and Adoption, and 44.44% for Leadership and Strategy).
9. CAR is used to determine an organisation's liquidity and leverage ratios and provides interested parties and shareholders insight into the financial soundness of a bank. CAR is assessed by dividing a bank’s capital by its risk-weighted assets. Organisations with a higher CAR to other industry players indicates it is more likely to absorb their losses compared to organisations with a lower CAR. Bank A recorded a CAR of 16.5%, with Bank B (38.50%) and Bank C (15.20%). Whilst Bank B scored the highest for CAR, followed by Bank A and then Bank C, the results for CAR are not aligned to the overall scores for Digital Maturity, namely the rankings for overall Digital Maturity saw Bank B (34.23% for Digital Enablement and Adoption, and 56.04% for Leadership and Strategy) with the highest scores, followed by Bank C (38.43% for Digital Enablement and Adoption,

and 69.98% for Leadership and Strategy) and Bank A (28.27% for Digital Enablement and Adoption, and 44.44% for Leadership and Strategy).

Table 9: Observations used for statistical analysis, Confidence Interval Testing and sampling of Business Performance indicators for financial periods 2018/2019

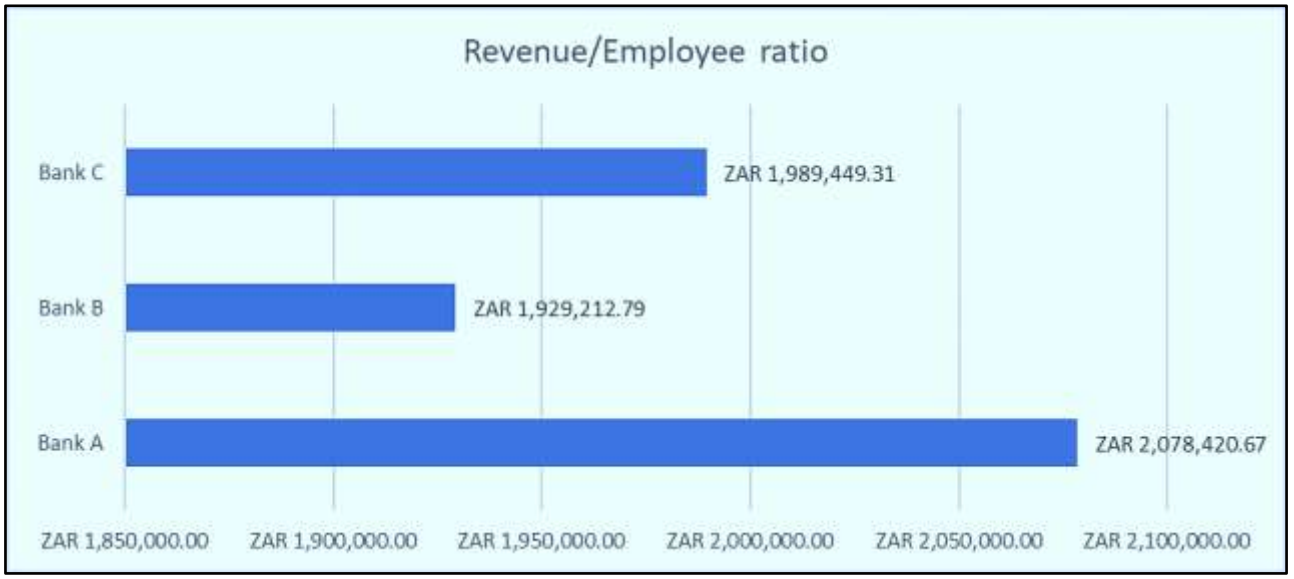
Financial ratios for period 2018/2019vwith Digital Maturity scores included				
		Bank A	**Bank B**	**Bank C**
1	Revenue/Employee ratio (RER)	2078420.67 (normalized to 34.657% of total)	1929212.79 (normalized to 32.169% of total)	1989449.31(normalized to 33.174% of total)
2	Fixed Asset Turnover ratio (FATR).	23.286%	18.915%	7.722%
3	EBIT Margin (income/revenue) (EBITM).	30.153	42.473	16.492
4	Net Profit Margin (net profit / revenue) (NPM)	22.262	31.283	14.921
5	Return on Equity 2018/2019 (RoE)	15.83%	11.1%	21.21%
6	Return on Assets 2018/2019 (RoA)	1.20%	0.50%	1.74%
7	Credit Loss Ratio 2018/2019 (CLR)	0.73%	6.9%	0.88%
8	Cost-to-Income Ratio 2018/2019 (CTIR)	57.70%	45.00%	51.80%
9	Capital Adequacy Ratio 2018/2019 (CAR)	16.50%	38.5%	15.2%
10	Digital Enablement and Adoption	28.27%	34.23%	38.43%
11	Leadership and Strategy	44.44%	56.04%	69.98%

Source: Financial Ratios taken from publically available Financial Statements and Digital Maturity are taken from Author’s calculations



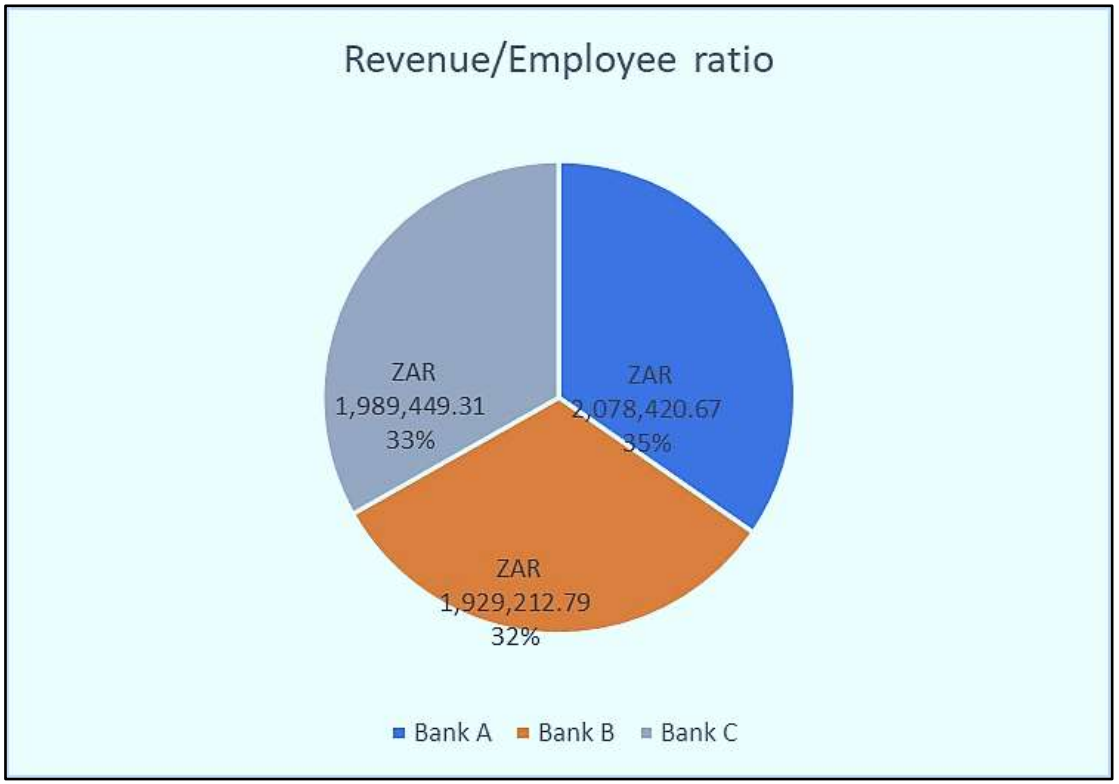
Source: Authors Calculations

Figure 4a – Scatter plot: Correlation amongst Business Performance indicators



Source: Authors Calculations

Figure 4b – Revenue per Employee ratio



Source: Authors Calculations

Figure 4c – Revenue per Employee ratio

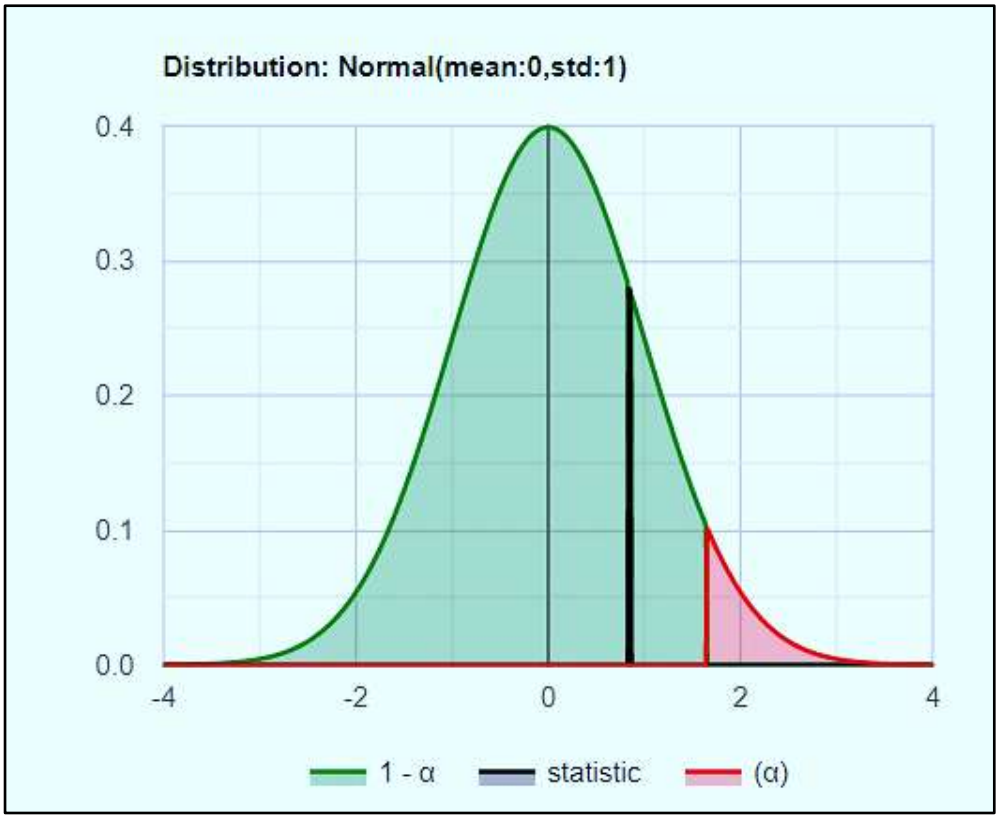
4.1.2.4 *Statistical analysis of Digital Maturity and Business Performance indicators*

There were only 3 banks assessed. This implies that although there were 29 responses, 14 for Bank A, 5 for Bank B and 10 for bank C, the sample was 3 as the unit of analysis was a bank. This is because CAR, CTIR, CLR, EBITM, FATR, NPM, RER, RoA and RoE was only per bank hence the analysis could not be done per survey respondent (see Table 10).

The requirement analysis using parametric techniques is that the sample should be at least 30 and the variables are normally distributed, thus the next section of the study discusses analysis and exploration of relationships amongst the Business Performance indicators and Digital Maturity using non-parametric techniques.

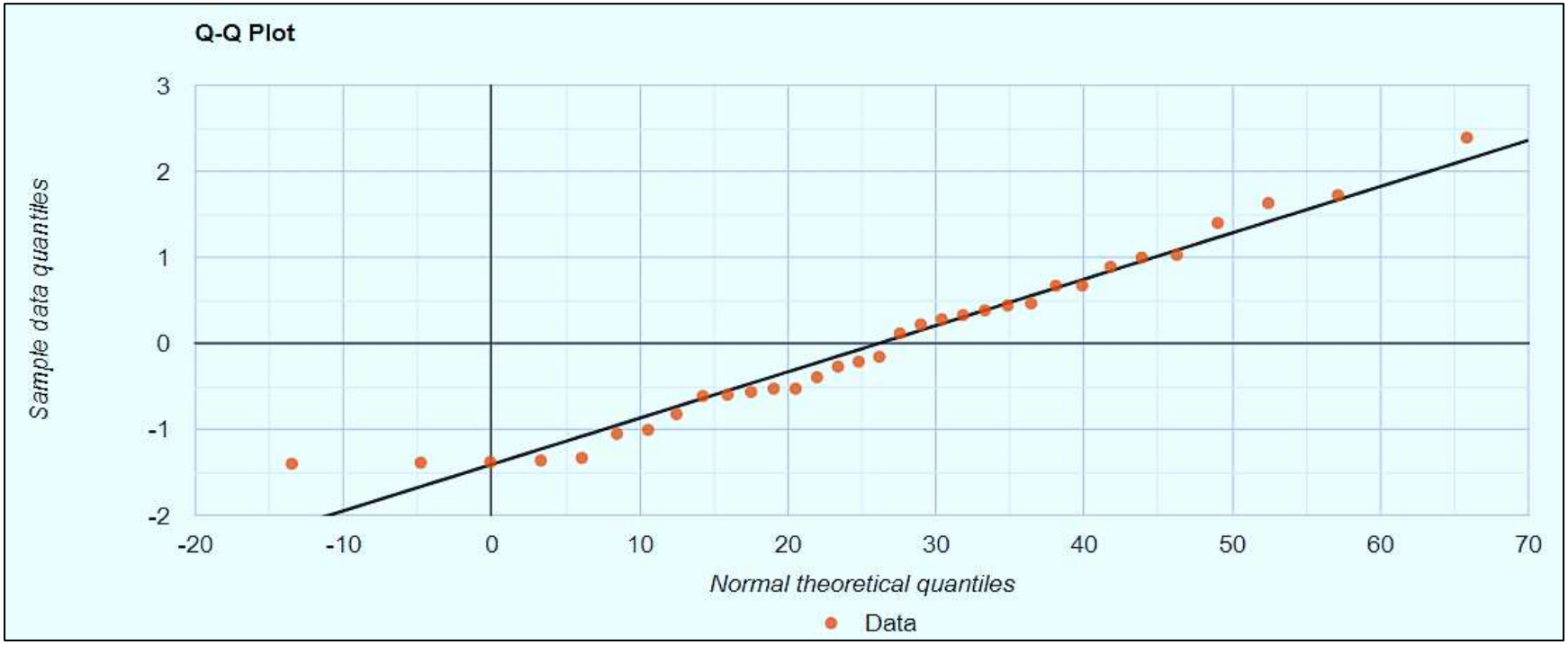
As the study was impacted by key challenges, namely: arranging participation of more South African-based banks; obtaining a sufficient number of survey responses from participating banks. These challenges were compounded by the difficulty of obtaining survey responses without introducing safety concerns or compelling respondents to prioritize participation during the Covid-19 pandemic. Nevertheless, the study proceeded to apply analysis techniques on the available data, under the premise that the 3 banks are a representation of the South African Banking industry and various attempts at soliciting more responses as well as enhance the available data have proven to be unsuccessful during the 9-month data collection period. On the basis of a sample size of 3, the data set for data analysis comprised the scores for overall Digital Maturity, namely: 1 observation per participating Bank for Digital Enablement and Adoption and 1 observation per bank for Leadership and Strategy, against the Business Performance indicators, namely: 9 observations per Bank for each of the selected Business Performance indicators.

Testing for Normal distribution the study made use of the non-parametric Shapiro-Wilk test (Shapiro, S., and Wilk. M., 1965), in order for data to have a normal distribution the data must produce a bell-shaped symmetrical curve nearest to the mean as well as the percentage of the data set must fall within standard deviations of the mean, ranging between -3 and +3 and whereby the mean is 0. The test results (see Appendix L and Figure 5a), produced a mean value of +1 as well as a p-value of 0.1987, thus the output for normality distribution indicates the difference between a normal distribution and the data set is not statistically significant. In summary, this output supports the view that whilst the data set may not be discarded for purposes of rudimentary data analysis, further enhancement of the data, in the form of additional survey responses, is deemed to produce more meaningful findings. In addition, whilst the test statistic is calculated as 95.6%, which is within the acceptable 95% region of acceptance. However, the effect size or value measuring the strength of the relationship between variables was calculated as 0.09522, indicating the magnitude of the difference between the sample distribution and the normal distribution is very small, and because the p-value (0.1987) is greater than the mean (0) it is assumed the data is normally distributed and a null assumption cannot be rejected or the sample did not provide strong evidence to conclude the existence of strong positive relationships between Digital Maturity and Business Performance indicators, as only weak and insignificant relationships can be observed (see Figure 5b).



Source: Authors Calculations

Figure 5a: Test for Normality of Data Set distribution: Digital Maturity and Business Indicators



Source: Secondary Data and Overall Digital Maturity from Primary Data

Figure 5b: Q-Q Plot testing data normality distribution

In an effort to ensure exhaustive data analysis and to compare results to the Shapiro-Wilk test (Shapiro, S., and Wilk. M., 1965), the study proceeded to assess the data set in a further round of data statistical analysis, this time Spearman's Correlation analysis (Spearman, C., 2010) was applied to test the strength and direction of relationship across variables, where r=1 indicates a perfect positive correlation and r=-1 indicates a perfect negative correlation (Field, A., 2018). Spearman's Correlation analysis (Spearman, C., 2010) was used to test relationships between overall Digital Maturity, as measured by Digital Enablement and Adoption as well as Leadership and Strategy, against each of the Business Performance indicators - the results are illustrated by Table 10, and with graphical illustrations found under Appendix M. The independent variables for the test as follows:

- Digital Enablement and Adoption: Bank A (28.27), Bank B (34.23) and Bank C (38.43)
- Leadership and Strategy: Bank A (44.44), Bank B (56.04) and Bank C (69.98)

The results for data analysis using Spearman's Correlation analysis (Spearman, C., 2010) indicate a non-significant very small negative relationship between Digital Enablement and Adoption and the following Business Performance indicators: RER (correlation coefficient -0.5, p-value 0.7658 and covariance -0.5), FATR (correlation coefficient -1.0, p-value 0.5000 and covariance -1), EBITM (correlation coefficient -0.5, p-value 0.7658 and covariance -0.5), NPM (correlation coefficient -0.5, p-value 0.7658 and covariance -0.5), CTIR (correlation coefficient -0.5, p-value 0.7658 and covariance -0.5) and CAR (correlation coefficient -0.5, p-value 0.7658 and covariance -0.5).

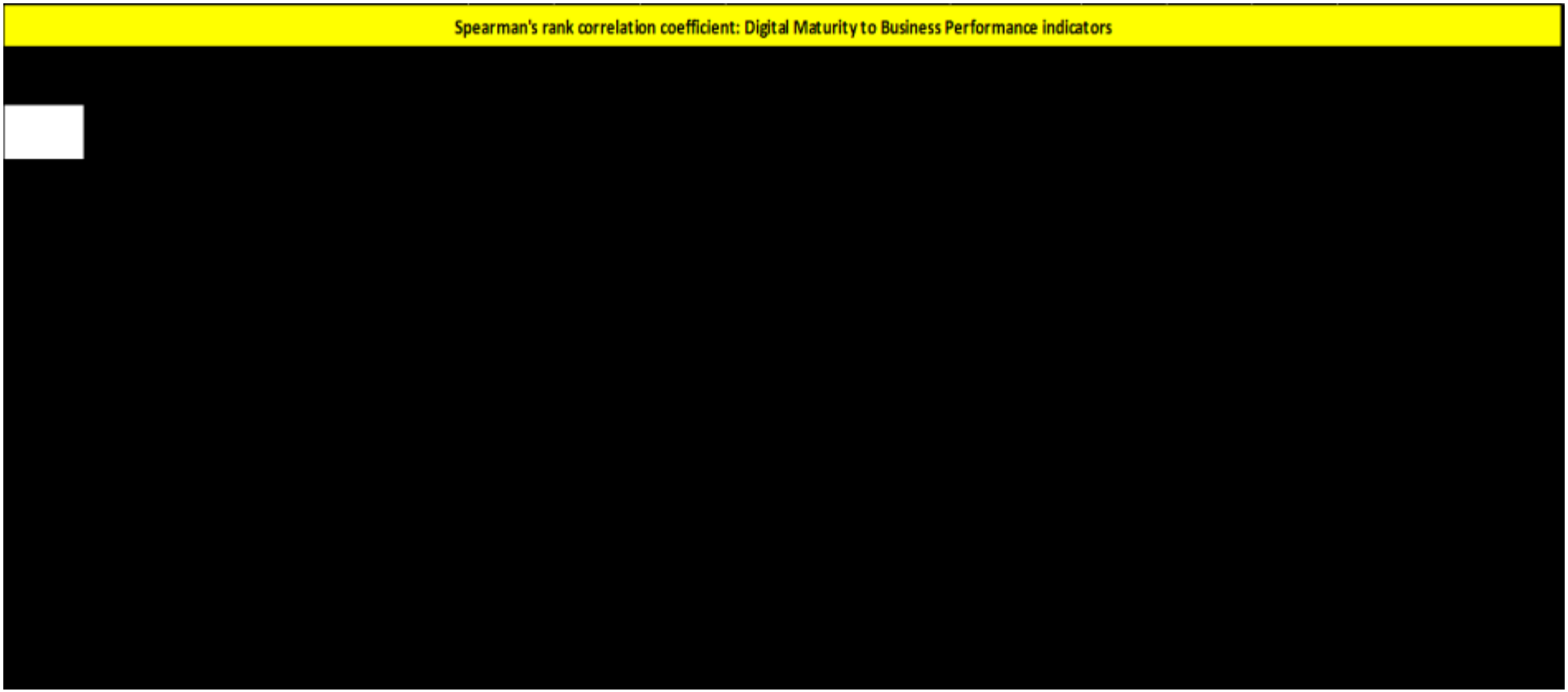
Furthermore, the results also indicate a non-significant large positive relationship between Digital Enablement and Adoption and the following Business Performance indicators: RoE (correlation coefficient 0.50, p-value 0.7658 and

covariance 0.5), RoA (correlation coefficient 0.50, p-value 0.7658 and covariance 0.5) and CLR (correlation coefficient 0.50, p-value 0.7658 and covariance 0.5).

The results for data analysis using Spearman's Correlation analysis (Spearman, C., 2010) indicate a non-significant very small negative relationship between Leadership and Strategy and the following Business Performance indicators: RER (correlation coefficient -0.5, p-value 0.7658 and covariance -0.5), FATR (correlation coefficient -1.0, p-value 0.5000 and covariance -1), EBITM (correlation coefficient -0.5, p-value 0.7658 and covariance -0.5), NPM (correlation coefficient -0.5, p-value 0.7658 and covariance -0.5), CTIR (correlation coefficient -0.5, p-value 0.7658 and covariance -0.5) and CAR (correlation coefficient -0.5, p-value 0.7658 and covariance -0.5).

Finally, the results also indicate a non-significant large positive relationship between Leadership and Strategy and the following Business Performance indicators: RoE (correlation coefficient 0.50, p-value 0.7658 and covariance 0.5), RoA (correlation coefficient 0.50, p-value 0.7658 and covariance 0.5) and CLR (correlation coefficient 0.50, p-value 0.7658 and covariance 0.5).

Table 10: Spearman's Correlation overall Digital Maturity with Business Performance indicators



Source: Author’s calculations

4.2 Conclusion

Following the results presented, the conclusion discusses the results of the study, according to the Research Objectives and Propositions (listed below).

- Research Objectives and proposition
    - RO-1: Whether or not there is a relationship between Digital maturity and accounting measures of Business Performance, namely, CAR, CTIR, CLR, EBITM, FATR, NPM, RER, RoA and RoE,
    - RO-2: Whether or not accounting measures of Business Performance is a proxy for Digital maturity in Banking.
    - Proposition: Whether or not Business Performance is a proxy for Digital transformation in banks.

4.2.1 *CAR, CTIR, CLR, EBITM, FATR, NPM, RER, RoA and RoE results pertaining to Research Objective RO-1*

The results for data analysis using the Shapiro-Wilk test (Shapiro, S., and Wilk. M., 1965), produced a test statistic of 95.6%, which is within the acceptable 95% region of acceptance, the effect size or value, however, measuring the strength of the relationship between variables was calculated as 0.09522, indicating the magnitude of the difference between the sample distribution and the normal distribution is very small, and because the p-value (0.1987) is greater than the mean (0) it is assumed the data is normally distributed and a null assumption cannot be rejected or the sample did not provide strong evidence to conclude the existence of relationship s between Digital Maturity and Business Performance indicators, as only weak and insignificant relationships can be observed (see Figure 5b).

The results for data analysis using Spearman's Correlation analysis (Spearman, C., 2010) indicates the following;

- a non-significant very small negative relationship between Digital Enablement and Adoption and the following Business Performance indicators: RER, FATR, EBITM, NPM, CTIR and CAR,
- a non-significant large positive relationship between Digital Enablement and Adoption and the following Business Performance indicators: RoE, RoA and CLR.

The results for the Shapiro-Wilk test (Shapiro, S., and Wilk. M., 1965) and Spearman's Correlation analysis (Spearman, C., 2010) are aligned on their findings, and suggest the available data set has failed to identify evidence of significant relationships (Field, A., 2018).

In conclusion, since there was no significant relationship between Digital maturity and Business Performance, the outcome of the study has failed to prove the proposition, and suggests that Business Performance as measured by CAR, CTIR, CLR, EBITM, FATR, NPM, RER, RoA and RoE cannot be used as a proxy for Digital Maturity in Banking overall.

5 DISCUSSION OF THE RESULTS AND FINDINGS

5.1 Introduction

This section presents the main findings from the empirical investigation. The first part of the section provides a univariate analysis of the survey respondents followed by a discussion of the findings from the multivariate analysis, which includes a discussion on the findings of the Digital Maturity assessment as well as statistical analysis pertaining to the exploration of relationships between Digital Maturity and accounting measures of Business Performance. This chapter discusses the main findings according to the Research Objectives and Proposition listed below:

- RO-1: Whether or not there is a relationship between Digital maturity and accounting measures of Business Performance, namely, CAR, CTIR, CLR, EBITM, FATR, NPM, RER, RoA and RoE,
- RO-2: Whether or not accounting measures of Business Performance is a proxy for Digital maturity in Banking.
- Proposition: Whether or not accounting measures of Business Performance is a proxy for Digital maturity in Banking.

5.2 Discussion of results pertaining to RO-1 and RO-2

The discussion of results pertaining to RO-1 and RO-2 focuses on the suitability of participants, Digital Maturity Assessment and statistical analysis.

5.2.1 *Findings from participant screening*

In terms of Work Experience in Banking, Table 5 shows the distribution of the results from the survey. The respondent's work experience in Banking had ranged from 0 years to 20+, with a small number of the population having 0-5 years of

experience (0%), whilst 7% are those with 6-10 years of experience, 41% have 11-15 years of experience, 34% have 16-20 years and 17% have 20 or more years of experience. This result reflects that data was collected among a population with extensive experience in the Banking industry, who are able to comprehend and contextualize the relevance of Digital Maturity to the Banking industry.

The view that respondents have a reasonable understanding of Digital Transformation, in the context of the South African banking industry, as supported by Table 6, further allows us to infer that 100% of respondents in the selected South African-based Banks to share an informed and knowledgeable understanding of Digital Maturity in Banking, with 65% of respondents having theoretically researched Westerman's Leading Digital Framework (see Appendix - I and Appendix – J) prior to participating in the survey as well as share prior working experience in Digital Maturity and able to contextualize Digital Maturity in Banking, the remaining 35% of respondents undertook to theoretically research Westerman's Leading Digital Framework (see Appendix - I and Appendix – J) prior to taking the survey and are able to contextualize Digital Maturity in Banking.

5.2.2 *Findings from participant suitability and Digital Maturity Assessment*

The Digital Maturity framework model presented in Appendix – J provides a broad view of the factors related to the present-day views of Digitally Transformation. As observed, it is evident that the factors have a varying impact and influence on the degree of effectiveness and value being unlocked through Digital Transformation.

Digitally transformed organisations extract higher levels of profits based on the level of Digital Maturity (Westerman, G., et al., 2014). Supporting this view, Garg, K., Fulzele, T.U., and Shukla, A.V. (2017) allude to Digital capabilities as being

the determinants of shareholder value. Deloitte (2018) view the benefits of Digital Transformation as being accredited by; penetration of smart devices, increased connectedness of consumers, internet penetration, and the ability for technological innovations to enable engagements that are in-tune with ever-changing customer needs. Havard Business Review (2017) highlights Digital skills as a barrier and entry-point towards Digital Transformation and make inference towards a disparate or partial achievement of Digital Maturity.

As illustrated by Table 7 and Figure 3, the median scores across all Banks as: Digital Enablement and Adoption (36.68%) and Leadership and Strategy (53.23%).

The combined use of Table 7 and Appendix – K.1 to Appendix – K.9 provide an overview of the scores across the 9 factors, with Figure 3 illustrating the Digital Maturity summaries plotted against the Cartesian-like plane. The overall Digital Maturity according to results for Digital Enablement and Adoptions (Bank A 28.27%, Bank B 34.23% and Bank C 38.43%) and Leadership and Strategy (Bank A 44.44%, Bank B 56.04% and Bank C 69.98%) has been plotted, with Bank A being plotted to the quadrant for Beginners as well as Bank B and Bank C being plotted to the quadrant for Fashionistas, this is the same for the Median measurement across all Banks, on this basis the following characteristics can be found for Bank A - Management sceptical of the business value of advanced digital technologies along with some experimentation and marred by an immature Digital culture - and Bank B and Bank C - advanced Digital features deployed in silos as well as no over-arching Digital vision, undeveloped coordination and a isolated Digital culture.

The analysis also revealed that all participants share a solid understanding of the impact of Digital Maturity, its benefits and the need for Banks to prioritize Digital Transformation as a means of remaining relevant to customer needs or run the risk of becoming irrelevant.

The following observations on Job Functions are worth noting, on the basis of a perceived misalignment of the priority of Digital Transformation, across all participant Bank:

- An overwhelming number responses had been obtained from managers,
- Just over 80% of respondents identified their job function as matching closely to that of an analyst 69% of the total respondents, and 12% of respondents identified their job function as matching closely to that of an analyst.
- Both job functions make up just over 80% of the total respondents, of concern is a balance of the respondents which comprise a low percentage of senior managers, project managers, heads of business areas and the fact that no responses were obtained from any c-suite or executive level job functions.
- From a leadership point of view, the Digital Transformation in Banking should be driven from the top down, and the lack of interest from executives and chief level executives is of significant concern and possess a high risk of delivering on the Digital Transformation objectives.

To support the above observations, Digital Maturity Assessment scores for Bank A and Bank C are used, and correlate these to Job Functions, in this manner one can illustrate low scores obtained for on the scores for Culture and Engagement (Bank A 38% and Bank C 54%) compared to Bank B which scored 51.3%, Leadership and Strategy (Bank A 44.44%, Bank B 56.04% and Bank C 69.98%) and Digital Enablement and Adoption (Bank A 28.27%, Bank B 34.23% and Bank C 38.43%).

In addition, not having Digital Transformation being driven from the top-down could also be resultant of contention amongst change management, whereby governance may be inclined towards Vision and Intent – there exists a close alignment of the scores for Vision and Intent (Bank A 43.2%, Bank B 55.0% and

Bank C 64.3%), Customer Orientation and Engagement (Bank A 38.7%, Bank B 43.0% and Bank C 60.0%), Governance and Organisation (Bank A 44.1%, Bank B 53.8% and Bank C 57.4%) and Technology and Data Embeddedness (Bank A 43.4%, Bank B 42.2% and Bank C 45.3%). This is not evident across all scores and when correlating the factors which characterise equity or investment of shareholders capital, one can identify a direct relationship on the scores for Innovation and Investment (Bank A 35.7%, Bank B 80% and Bank C 86.7%), and New Value Streams and Business Models (Bank A 60.8%, Bank B 40.0% and Bank C 88.0%).

Even as respondents are aligned on the view that Governance and Organisation, across the participating banks, promotes a top-down approach towards Digital Transformation, the low scores also attained for Technology and Data Embeddedness (Bank A 43.4%, Bank B 42.2% and Bank C 45.3%) suggest a limited investment towards Digital Technology and less than the satisfactory outcome from investment towards Digital skills and technology. This is evident from the low scores attained for this Digital Enablement and Adoption (Bank A 28.27%, Bank B 34.23% and Bank C 38.43%) and highlights the Banks are divided on the views that Digital Transformation is a shared responsibility, from planning and design, through to final sign-off (Gartner, 2018). This point also highlights that the Banks are divided on the views that sustainable strategy execution must include innovation and entrepreneurship, where adequate entrepreneurial behaviours drive enhanced Business Performance, employee satisfaction, knowledge sharing, and positive staff morale (Harter, H.K., et al., 2010).

Harter, H.K., et al. (2010) suggest that sustainable strategy execution must include innovation and entrepreneurship and is best channelled via a top-down approach, where an adequate application of entrepreneurial behaviours drives enhanced Business Performance, employee satisfaction, knowledge sharing, and positive staff morale. This alignment is indeed required to drive Retail-customer

engagement, where customers are opting for engagement channels that offer convenience, and it is for this reason that Banks should focus energies towards Digitally transforming their Digital channels and data analytics capabilities (Latimore, D., 2017:21).

5.3 Discussion of results pertaining to research objectives RO-1 and RO-2

The discussion of results pertaining to research objectives RO-1 and RO-2, focusing on the outcomes of the statistical analysis and was followed by the conclusion of the discussion.

5.3.1 *Findings from statistical analysis*

As Westerman's Leading Digital Framework (see Appendix - I and Appendix – J) features evidence of links between Digital Maturity and Business Performance, and further discusses the measurement hereof, through the assessment of the following Business Performance indicators: Revenue per employee; Fixed-Asset turnover, Earnings margins and Net-profit margin. It must be noted the data analysis, in determining relationships between overall Digital Maturity and the aforementioned Business Performance indicators, failed to produce strong positive relationships. This section discusses the findings of the analysis performed.

Analysis was performed using data from the financial period 2018/2019, the data comprised Digital maturity and accounting measures of Business Performance, as measured by CAR, CTIR, CLR, EBITM, FATR, NPM, RER, RoA and RoE.

The results for data analysis using the Shapiro-Wilk test (Shapiro, S., and Wilk. M., 1965), produced a measurement for the strength of the relationship between

variables was calculated as 0.09522, indicating the magnitude of the difference between the sample distribution and the normal distribution is very small, and because the p-value (0.1987) is greater than the mean (0) it is assumed the data is normally distributed and the sample did not provide strong evidence to conclude the existence of strong positive relationships between Digital Maturity and Business Performance indicators, as only weak and insignificant relationships, can be observed (see Figure 5b).

The results for data analysis using Spearman's Correlation analysis (Spearman, C., 2010) indicated a non-significant very small negative relationship between Digital Enablement and Adoption and the following Business Performance indicators: RER, FATR, EBITM, NPM, CTIR and CAR.

Furthermore, the results also indicated a non-significant large positive relationship between Digital Enablement and Adoption and the following Business Performance indicators: RoE, RoA and CLR.

The results for data analysis using Spearman's Correlation analysis (Spearman, C., 2010) indicated a non-significant very small negative relationship between Leadership and Strategy and the following Business Performance indicators: RER, FATR, EBITM, NPM, CTIR and CAR. Finally, the results also indicated a non-significant large positive relationship between Leadership and Strategy and the following Business Performance indicators: RoE, RoA and CLR.

The results for the Shapiro-Wilk test (Shapiro, S., and Wilk. M., 1965) and Spearman's Correlation analysis (Spearman, C., 2010) are aligned, and suggest the available data set has failed to identify evidence of significant relationships (Field, A., 2018).

Thus the outcome of the study has failed to prove the proposition, and suggests that Business Performance as measured by CAR, CTIR, CLR, EBITM, FATR,

NPM, RER, RoA and RoE cannot be used as a proxy for Digital Maturity in Banking overall. Whether or not there is a relationship between Digital maturity and Business Performance is yet to be resolved and a more scientific manner of assessing Digital Maturity may assist to establish the views around Digital Maturity.

Sullivan, B., et al. (2014) are concerned with the incongruent levels of Digital Maturity within Banks, resulting from the top-down execution of the below 6 priority areas of technology innovation, listed below:

- Customer-centric business models;
- Omni-channel distribution;
- Simplified operating models;
- Knowledge management and insights based decision-making;
- Innovation and entrepreneurship; and
- Risk management.

Banks are complex organisations and are hard at work, driving Digital Transformation of legacy systems during a time when FinTechs are flooding the Banking arena (Tandulwadikar, A., 2014:5). The timeline for South African-based Banks to Digitally Transform suggests it is time for radical thinking and for Digital Transformation to be performed in harmony, specifically across different organisational structures.

5.4 Conclusion

Analysis of the empirical data received from the 29 respondents suggests the selected South African-based banks exhibit incongruent levels of Digital Maturity across the factors measured, using the extended version of the Westerman, G., et al.(2014) Digital Maturity framework (see Appendix - I and Appendix – J).

The efficiency of a bank is generally measured through the extent to which resources are being allocated as well as its ability to produce a maximum set of outputs using the smallest possible amount of inputs (Falkena, H., Davel, G., Hawkins, P., Llewellyn, D., Luus, C., Masilela, E., Parr, G., Pienaar, J., and Shaw, H. 2004). A key problem to this study is a variation in Business Performance and the larger factors at play, which are extraneous to the study and had an impact on Business Performance. These larger factors possess a high potential to influence the priority and investment towards Digital Transformation. These factors are; legacy technologies, business strategies, South African Banking regulatory framework which is risk-averse and leans towards sustainable economic growth.

The analysis revealed there was no significant relationship between the independent variables, namely: Digital Maturity and the dependent variables, Business Performance indicators, namely: CAR, CTIR, CLR, EBITM, FATR, NPM, RER, RoA and RoE. The Shapiro-Wilk test (Shapiro, S., and Wilk. M., 1965) and Spearman's Correlation analysis (Spearman, C., 2010) presented a noteworthy observation on the existence of non-significant large positive relationship between overall Digital Maturity, as measured by Digital Enablement and Adoption, and Leadership and Strategy and the following Business Performance indicators: RoE, RoA and CLR. This finding is however could not be substantiated.

Whether or not accounting measures of Business Performance is a proxy for Digital maturity in Banking is yet to be verified, and the researcher suggests a two-pronged approach, starting with an established means of scientifically assessing the efficiency and performance of an organisation – in terms of set factors and / or indicators - before attempting to assess the level of Business Performance. This approach is intended to be used as a means of comparing

standardized variables against Digital Maturity (Curtis, B., et al., 2010; Pöppelbuß, J., and Röglinger, M., 2011).

Digital Transformation is a developing phenomenon and is discussed as a hot topic in C-suite boardrooms. Digital Transformation strategies are being forced to deal with continuous change and significant uncertainty (Jaubert, M. *et al*., 2014:1).

McKinsey (2019) anticipate only 30% - 50% of retail transactions will migrate toward online by the year 2025. The migration was indeed intensified by the global COVID-19 lockdown measures which saw a 47.54% increase in worldwide e-commerce sales from 12.2% in 2018 to 19.5% in 2020 (Copolla, D., 2021). The conundrum beginning to emerge is whether or not organisations can account for the benefits of Digital Transformation during times when organisational change is happening more rapidly than financial-accounting frameworks can measure. For example, the abrupt implementation of COVID-19 lockdown measures forced the world economy to prioritize efforts and resources towards Digital channels and an all-or-nothing approach towards experimentation of new business models.

6 CONCLUSIONS and RECOMMENDATIONS

6.1 Introduction

This chapter concludes the research report and provides conclusions on the research objectives that underpin this study. The chapter also discusses the relevant limitations and recommendations against the research objectives, before concluding with suggestions for future research for each of the research objectives.

6.2 Conclusion of the study

The main objectives of the study was to explore relationships between Digital Transformation and Business Performance of selected South African-based banks. The study was deemed beneficial based on general gaps in current research on Digital Maturity of the South African banking industry.

The study looked at retail banks that offer services and products through online channels as well as retail banks only available to customers when physically inside of a bank branch, by telephone or at an offsite banking kiosk. The unit of analysis was the South African Banking industry, with sample within the industry being the individual Banks. Only 3 banks were assessed under the study, the unit of analysis was a bank, with CAR, CTIR, CLR, EBITM, FATR, NPM, RER, RoA and RoE considered per bank (see Appendix – L). Non-parametric techniques were used to assess whether there was a relationship between Business Performance and Digital maturity, namely: Shapiro-Wilk test (Shapiro, S., and Wilk. M., 1965) and Spearman's Correlation analysis (Spearman, C., 2010). Combined regression testing was performed for Bank A and Bank C, using CAR, CTIR, CLR, EBITM, FATR, NPM, RER, RoA and RoE for the periods 2018/2019 and Digital Maturity assessment for the period 2018/2019.

When using CAR, CTIR, CLR, EBITM, FATR, NPM, RER, RoA and RoE the analysis identified that Digital Maturity overall had a weak and insignificant impact on Business Performance and indicates that there is not sufficient evidence to suggest a substantial relationship between Digital maturity and Business Performance.

Whilst the study did not prove whether or not Business Performance is a proxy for Digital maturity in Banking, the study adds to growing evidence that suggests Digital Maturity has become a popular feature amongst the enablement of business strategies and contributes to businesses wanting to remain abreast of ever-changing customer needs.

6.3 Contributions of the study

Although past research has examined Digital Transformation, this research study filled a gap by extending that work to explore Digital Transformation in the South African Banking industry. The developments of Digital Transformation in Banking and significant growth of Digital engagement in Banking during a time such as the COVID-19 pandemic motivation for the study. The study contributed through investigation of the relationship between Digital Transformation and Business Performance, based on Westerman's Leading Digital Framework (see Appendix - I and Appendix – J), where dependent variables (Business Performance indicators), and independent variables (Digital Maturity) where explored as a means of benchmarking Digital Transformation in the South African Baking industry and the standardization of the activities pertaining to the benchmarking and profit potential of Digital Transformation.

These were noteworthy additions as the notion that financial firms are unable to compete with Fintech start-ups at the current rate of Digital innovation in the South African banking industry has introduced a number of uncertainties for consumers and parties concerned with the South African Banking industry. Whilst the study

has failed to produce conclusive evidence of relationships between Digital Transformation and Business Performance of South African-based banks, it has provided a new lens through which to explore such relationships.

6.4 Limitations of the study

The study contributes to the understanding of Digital Transformation, in exploring for relationships between Digital Transformation and Business Performance of selected South African-based banks. It has limitations as mentioned in previous chapters:

- Limited insight into the Digital technologies and capabilities that exist within the value-chains of the selected South African-based banks.
- Limited insight into the Digital Transformation strategies of the selected South African-based banks.
- South African-based Digital banks have not been fully operational and / or may have experienced material changes, such as retrenchments, directorship, shareholder and organisation-structure changes, since the beginning date of the longitudinal period of 1 January 2014.
- The impact of the COVID-19 pandemic is not fully understood and its impact may significantly sway the cognitive ability and lifestyles of respondents as well as limit the availability of respondents and Banks.
- The impact of the COVID-19 pandemic continues to force industries and individuals to gravitate towards a work-from-home or remote-working business operating model, rather than an office-based operating model. Forcing a top-down organisational change that may directly influence the investment towards Digital Transformation.
- The banks that agreed to participate in the study have opted to remain anonymous.

- Whilst there exists a high number of accounting measures of Business Performance, this study focussed on CAR, CTIR, CLR, EBITM, FATR, NPM, RER, RoA and RoE, based on these being established accounting measures and widely used to measure Business Performance.
- Strategic objectives has a high potential to influence priority and investment towards Digital Transformation.
- The limitations of having valid data for only 3 banks cannot be overlooked and the study acknowledges the challenges of normalising measures of Business Performance to get comparable data which controls out the differences in strategy and context, and suggest alternative ways to get representative, comparable measures business performance.

6.5 Recommendations

Digital technologies coupled with pressure from ever-changing customer needs are disrupting the Banking industry, the extent of the disruption is not known and indeed exacerbated by the impact of Covid-19. The South African Banking industry has been significantly impacted by Covid-19 and has no choice but to undergo expedited Digital Transformation to mitigate the customer risks and align to Covid-19 hygiene protocols as well as movement restrictions imposed on Corporate and Retail Banking customers. South African-based Banks must prioritize and expedite Digital Transformation to attain new business models, with a customer-centric focus. It will be advantageous to incorporate Digital Transformation into the overarching business strategy of an organisation.

6.5.1 *Recommendation 1 – Accounting for Digital Maturity and Strategy execution through Governance, Leadership structures and standardized measurable*

Broeders and Khanna, (2015) and Kane, G. et al. (2015) are aligned on the views that the sound execution of a successful digital strategy must be driven by actively

engaged leadership as well as clear communication and harmony amongst every employee impacted by Digital Transformation plan.

The efficiency of an organisation can be measured through the extent to which resources are being allocated, Banks will find it challenging to Digitally Transform through the use of legacy resources (Falkena, H. et al, 2004). Legacy resources are something that results in delayed and complex Digital Transformation for organisations such as Banks (Mester, L.J., 1993). Banks must ensure that the best practices of Digital Transformation are implemented pragmatically and uniformly to avoid disparity across the organisational factors.

In reference to Appendix – J:

- A close alignment on the scores for Vision and Intent (Bank A 43.2% and Bank C 64.3%), Customer Orientation and Engagement (Bank A 38.7% and Bank C 60.0%), Governance and Organisation (Bank A 44.1%and Bank C 57.4%) and Technology and Data Embeddedness (Bank A 43.4% and Bank C 45.3%) suggests a situation where Digital Transformation is partially being driven from the top down and resulting in contention when organisational resources are deployed for the purpose of Digital Transformation.
- Respondents are aligned on the view that Governance and Organisation, across the participating banks, promotes a top-down approach towards Digital Transformation, the low scores also attained for Technology and Data Embeddedness (Bank A 43.4% and Bank C 45.3%) suggest a limited investment towards Digital Technology and a less-than-satisfactory outcome from investment towards Digital skills and technology. This is evident from the low scores attained for this Digital Enablement and Adoption (Bank A 28.27% and Bank C 38.43%), and highlights the Banks are divided on the views that Digital Transformation is a shared responsibility, from planning and design, through to final sign-off (Gartner, 2018). This point also highlights that the Banks are divided on the views

> that sustainable strategy execution must include innovation and entrepreneurship, where adequate entrepreneurial behaviours drive enhanced Business Performance, employee satisfaction, knowledge sharing, and positive staff morale (Harter, H.K. et al., 2010).

Harter, H.K. et al. (2010) suggest that sustainable strategy execution must include innovation and entrepreneurship and is best channeled via a top-down approach, where an adequate application of entrepreneurial behaviour will be what drives enhanced Business Performance, employee satisfaction, knowledge sharing, and positive staff morale. This alignment is indeed required to drive Retail-customer engagement, where customers are opting for engagement channels that offer convenience, and it is for this reason that Banks should focus energies towards Digitally transforming their Digital channels and data analytics capabilities (Latimore, D., 2017:21).

Banks may benefit from considering a two-pronged approach towards Digital Transformation, starting with a standardized means assessing the efficiency and performance of Digital capabilities – in terms of set factors and / or indicators - before assessing the level of Digital Maturity and then correlating this with Business Performance. This will result in comparing standardized variables against their levels of Digital Maturity (Curtis, B., et al., 2010; Pöppelbuß, J., et al., 2011).

6.6 Suggestions for further research

Additional research may be required to identify and establish a robust framework capable of measuring Digital Maturity and correlating this to established accounting measures of Business Performance. The complexity of achieving this may lie in the fact that organisations are changing more rapidly than financial-accounting frameworks can measure. Whether or not organisations can Digitally transform as well as account for the benefits of Digital Transformation is yet to be

accounted for by a South African-based bank. COVID-19 is a constant reminder that forced the world economy to prioritize efforts and resources towards Digital channels and an all-or-nothing approach towards experimentation of new business models. Future areas of research on this topic remain:

- Evaluate the success of different frameworks on Digital Maturity against established accounting measures of Business Performance, for a standardized means of measuring the benefits of Digital Maturity.
- Evaluate the success of standardizing the evaluation of Digital Maturity through the use of an established scientific-based assessment of Digital Maturity – with set factors and / or indicators.

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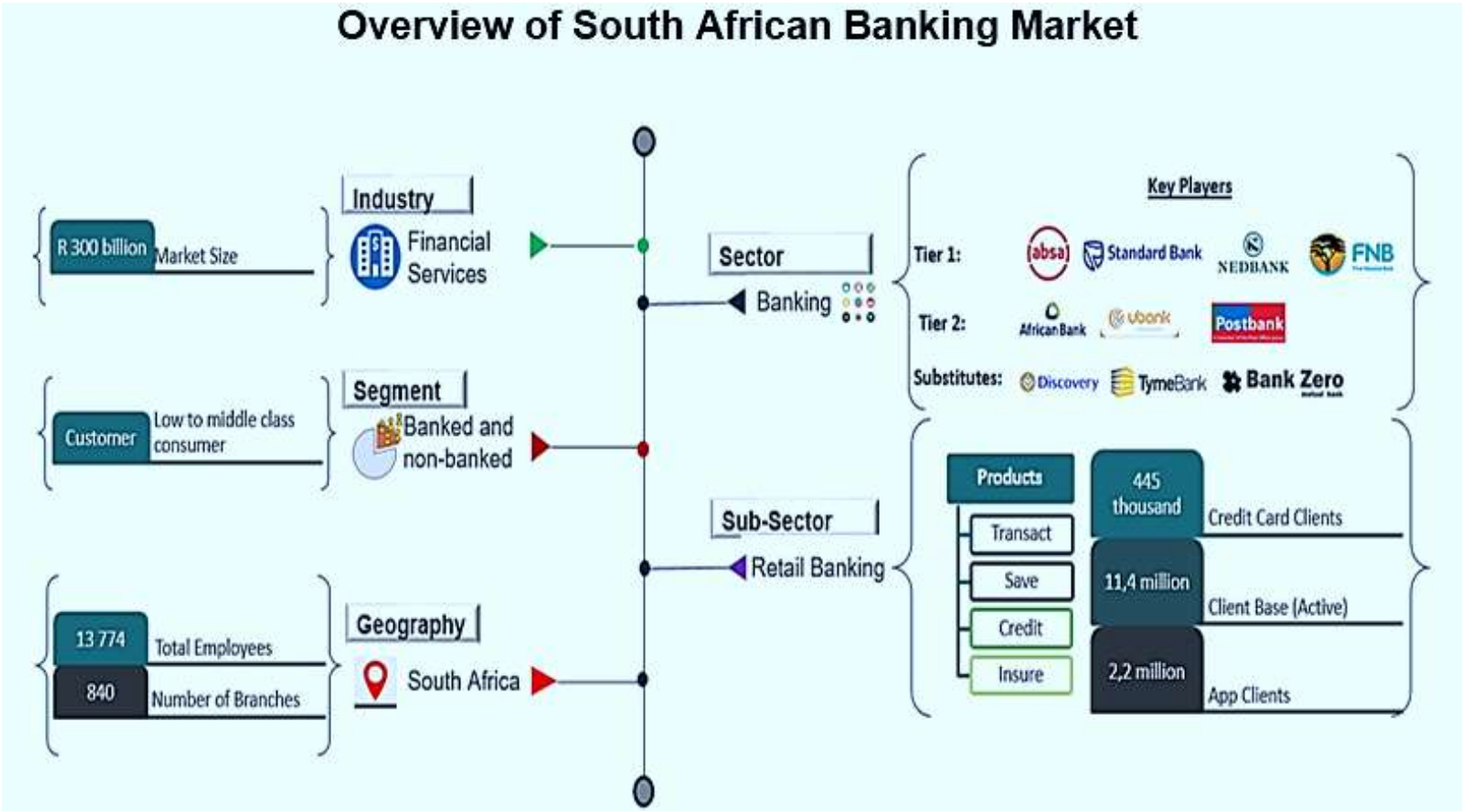
APPENDIX

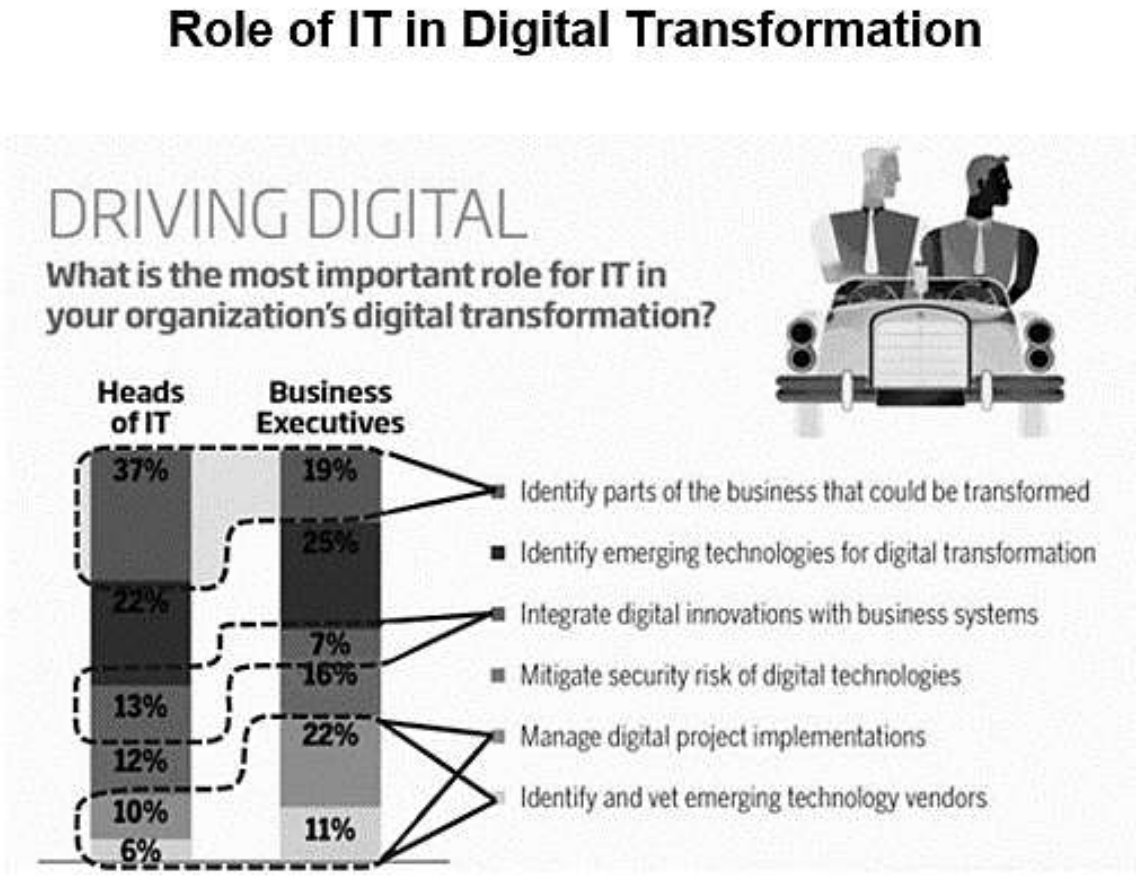
Appendix – A – Overview of South African Banking Market


Overview of South African Banking Market
Industry
R 300 billion
Market Size
Financial Services
Sector
Banking
Key Players
Tier 1:
absa
Standard Bank
NEDBANK
FNB
Tier 2:
African Bank
Ubank
Postbank
Substitutes:
Discovery
TymeBank
Bank Zero
Customer
Low to middle class consumer
Segment
Banked and non-banked
Sub-Sector
Retail Banking
Products
Transact
Save
Credit
Insure
445 thousand
Credit Card Clients
11,4 million
Client Base (Active)
2,2 million
App Clients
13 774
Total Employees
840
Number of Branches
Geography
South Africa

Banking channel transaction volumes and channel usage analysis of South African-based banks with largest number of physical branches (Adopted from 2019 published financial statements)								
		FNB	Capitec	ABSA	Nedbank	Standard Bank	PostBank	African Bank
Physical Footprint	Total Physical Branches	619	840	640	702	1200	1500	394
	Total Automated Teller Machines	5780	5011	8802	4242	9321	0	Not available
Digital Channels transaction volumes	Internet Banking	197,957,000	343 ,000 ,000 combined total	2019 audited financial statements informs of 34.5% digitally active customers. Channel level transaction volumes not provided.	2019 audited financial statements & publications informs of 5.8Million total customer, of which 1.7Million customer are digitally active. Channel level transaction volumes not provided.	2019 audited financial statements informs of 80% or approx R400Billion worth of transactions conducted digitally, across Personal & Business Banking business lines. Channel level transaction volumes not provided.	Not considered as part of analysis due to online banking facility currently only available to internal staff members	2019 financial statements informs ofcontribution to overall transaction volumessales, with direct sales channel having contributed R1698Million and digital channel contributing having contributed R451Million
	Banking Application	237,873,000						
	Mobile Banking	42,050,000						
Physical Channels transaction volumes	Point-of-Sale	578,634,000	Not available					
	Card Swipes	872,989,000	Not available					
	ATM	245,433,000	47,000,000					

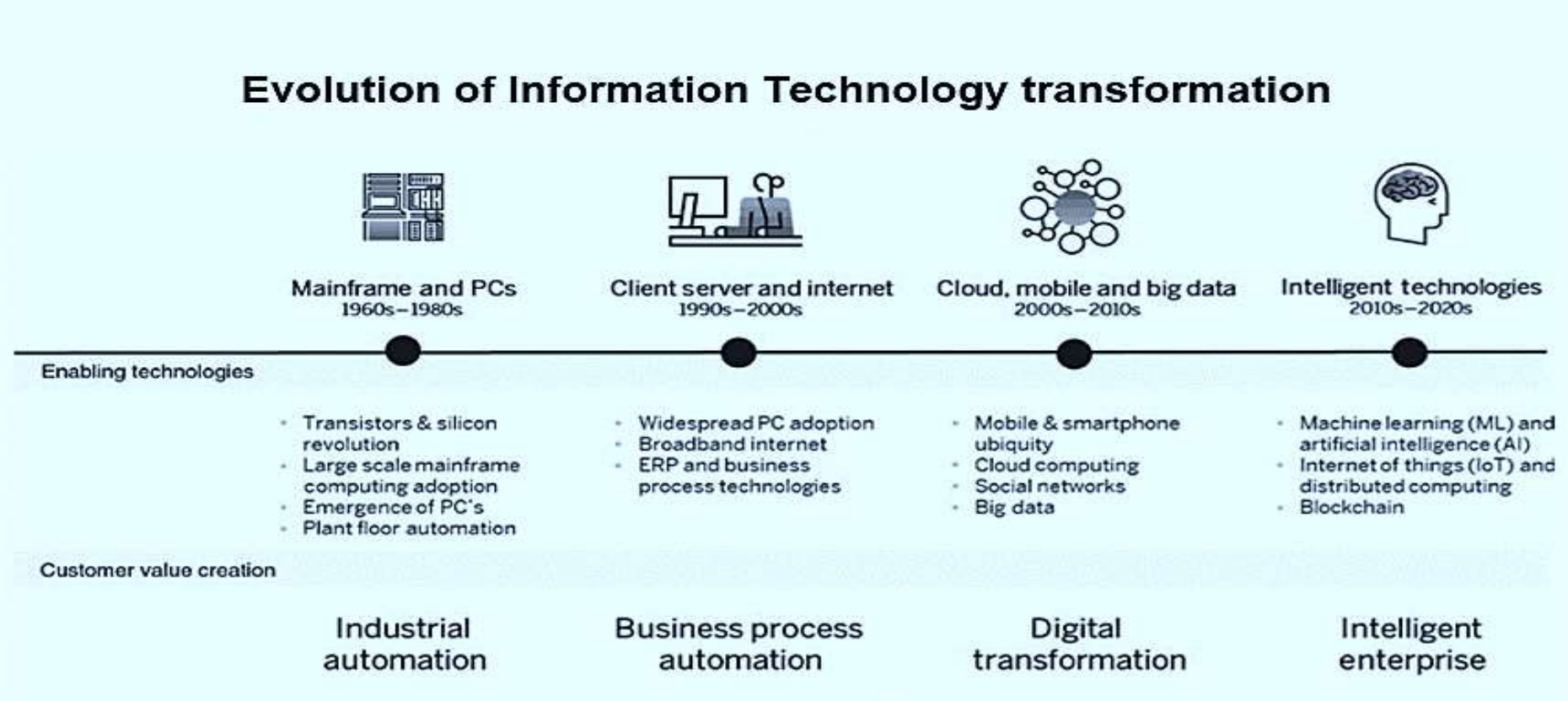
Appendix – A: Overview of South African Banking Market. Sources: ABSA Group Limited Results Booklet for 2019, African Bank Financial Results 2019, Capitec Integrated Annual report, 2019, FirstRand Bank Annual Report 2019, Nedbank Group Audited Financial Statements 2019, Standard Bank Annual Report 2019, PostBank Annual Report 2019

Appendix – B – Role of IT in Digital Transformation



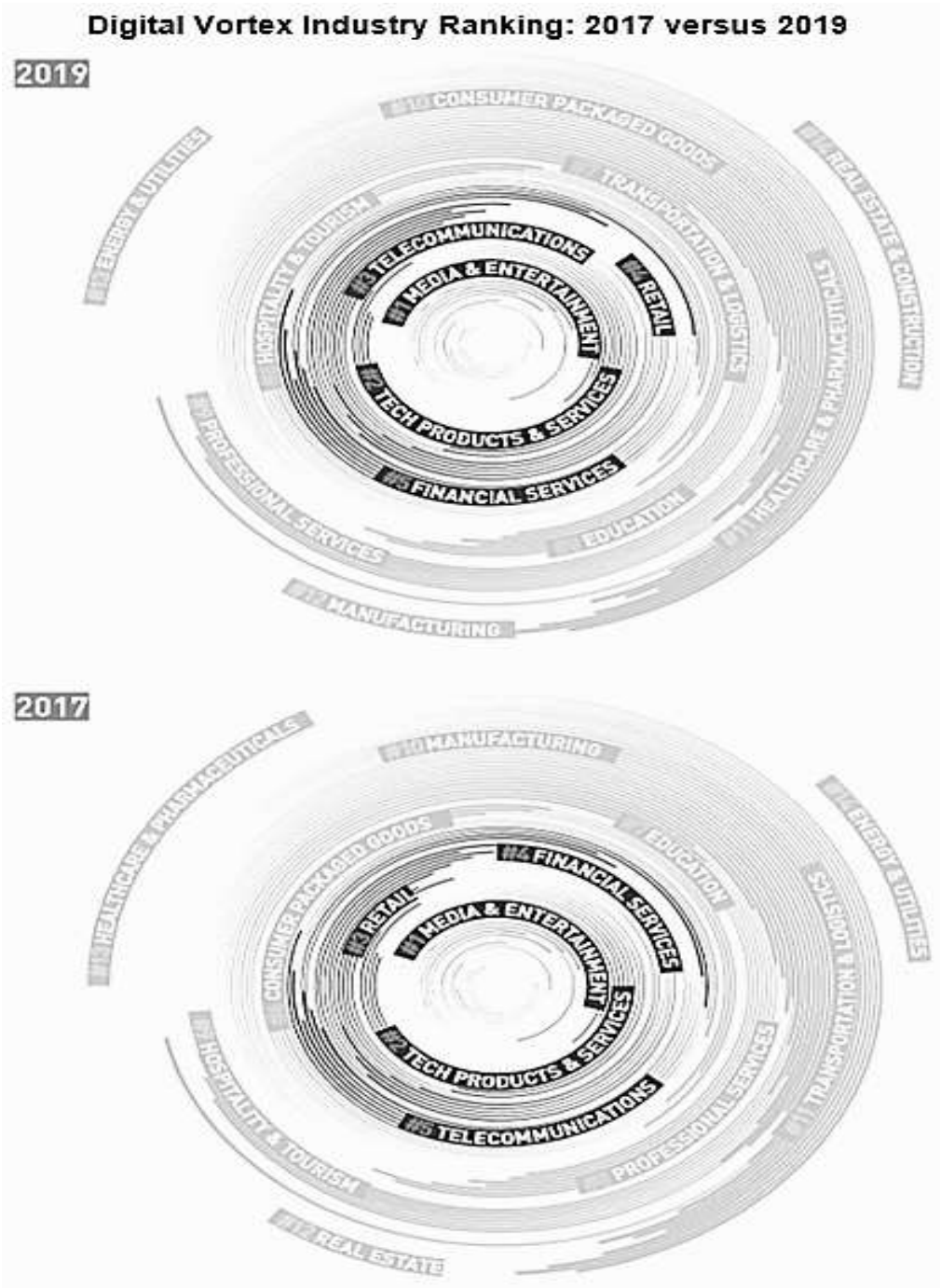
Appendix - B: Role of IT in Digital Transformation Source: CIO.com, (2018)

Appendix – C – Evolution of Information Technology transformation



Appendix - C: Evolution of Information Technology transformation (Source: Toldo, L., et. Al, 2018)

Appendix – D – Digital Vortex Industry Rankings



Appendix - D: Digital Vortex Industry Ranking: 2017-2019 (Source: (Wade, M., Yokoi, T., Shan, J., and Macaulay, J., 2019)

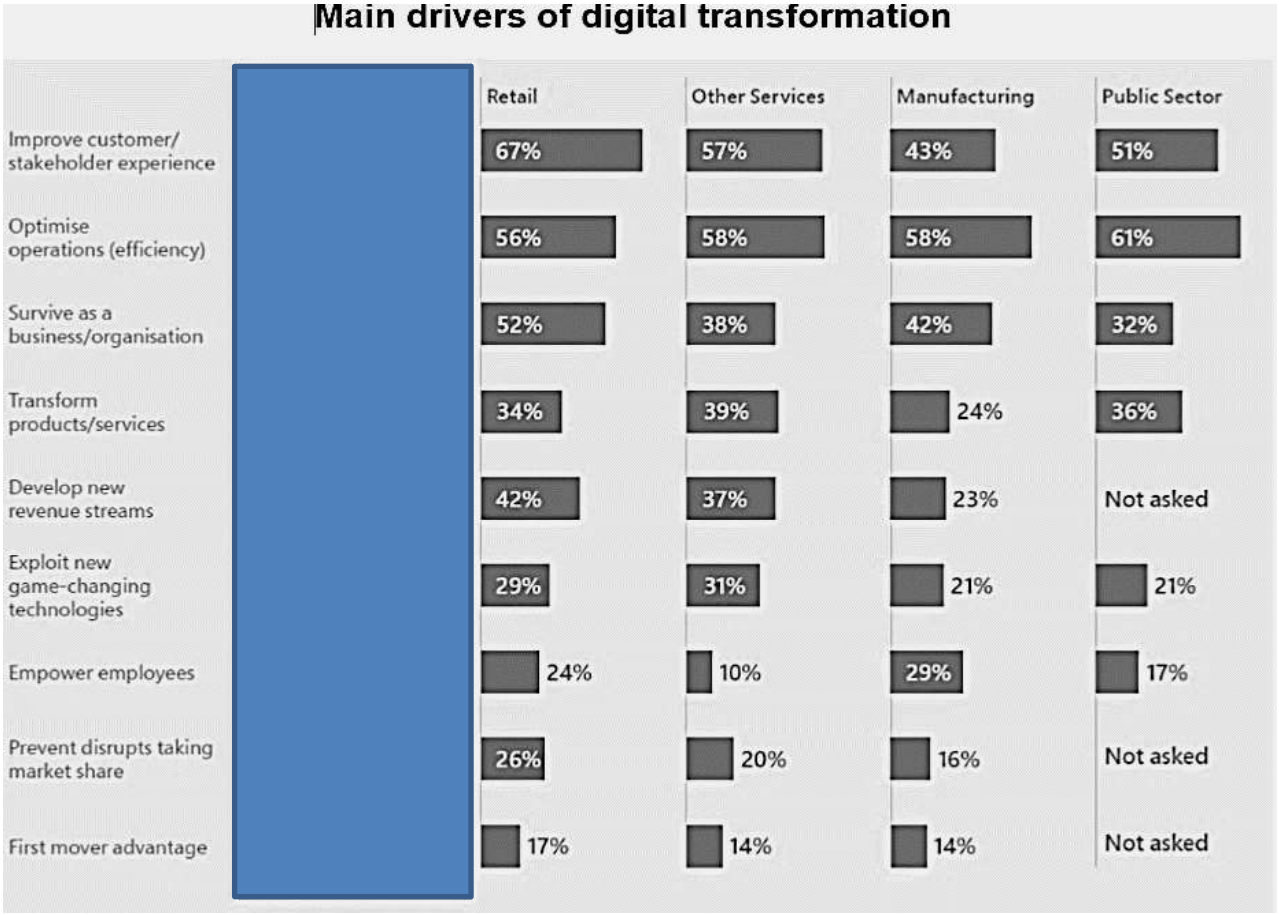
Appendix – E – Digital Vortex Industry Rankings

Digital Vortex Industry Ranking: 2017 versus 2019

2019	RANKING	2017
Media & Entertainment ←	1	Media & Entertainment
Technology Products & Services ←	2	Technology Products & Services
Telecommunications ↖+2	3	Retail
Retail ↙-1	4	Financial Services
Financial Services ↙-1	5	Telecommunications
Hospitality & Tourism ↖+3	6	Consumer Packaging Goods
Transportation & Logistics ↖+4	7	Education
Education ↙-1	8	Professional Services
Professional Services ↙-1	9	Hospitality & Tourism
Consumer Packaging Goods ↙-4	10	Manufacturing
Healthcare & Pharmaceuticals ↖+2	11	Transportation & Logistics
Manufacturing ↙-2	12	Real Estate
Energy & Utilities ↖+1	13	Healthcare & Pharmaceuticals
Real Estate & Construction ↙-2	14	Energy & Utilities

Appendix - E: Digital Vortex Industry Ranking: 2017 versus 2019 (Source: Yokoi. T., Shan. J., Wade. M., Macauley. J., 2019)

Appendix – F – Main drivers of Digital Transformation



Appendix - F: Main drivers of Digital Transformation Source: Microsoft (2016:1-62)

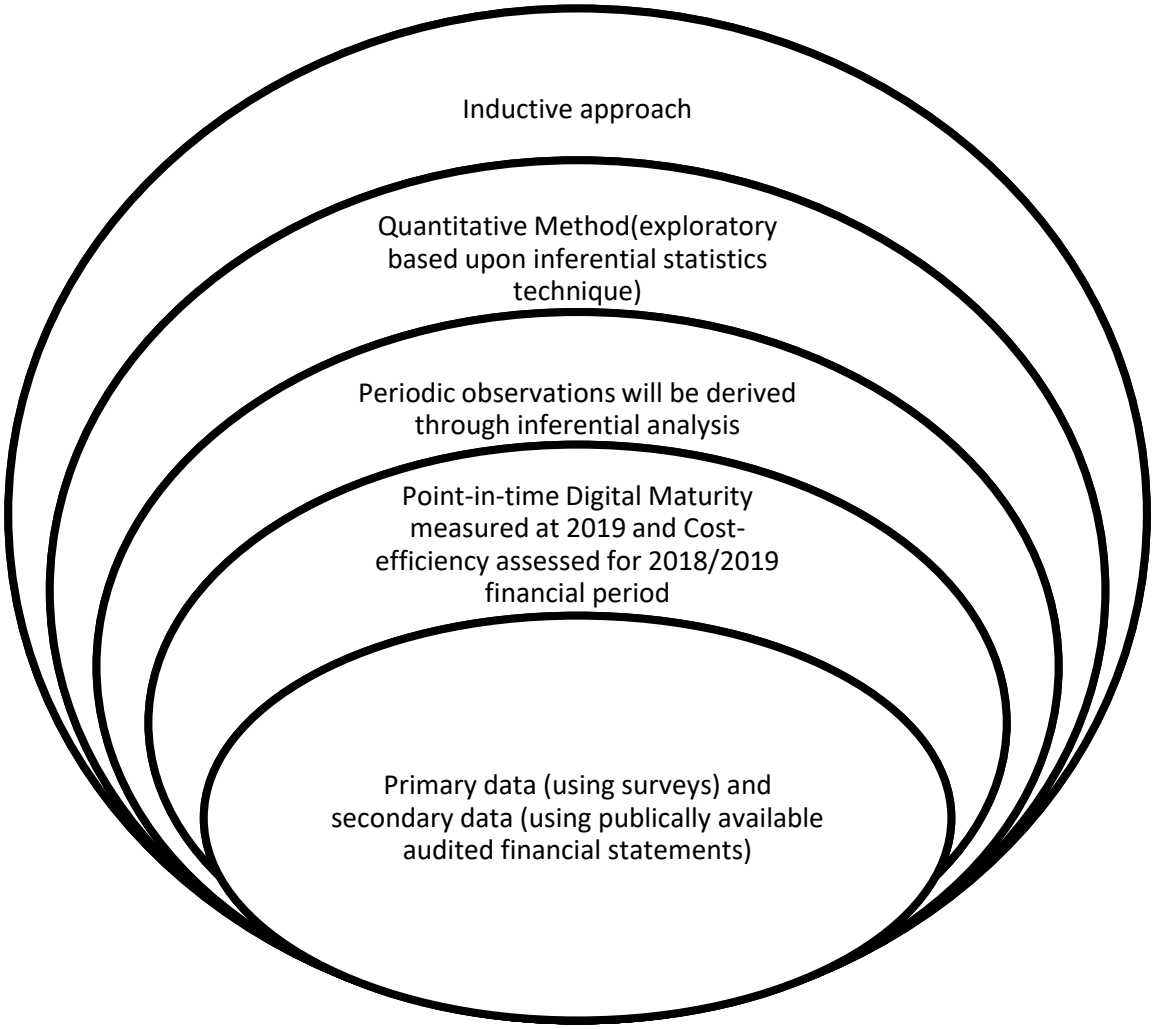
Appendix – G – Challenges and Opportunities of Digital Transformation

Challenges and Opportunities of Digital Transformation

Category	Opportunities	Challenges
Market-orientation	*Customers* • increase in customer loyalty • strengthened customer relationships • possibility to create better (contextual) offers *Market position* • increase in attention and awareness • increase in market visibility • tap new market potentials • development into entirely new markets • strengthened competitive position	*Customers* • adapting to customer requirements to ensure long-term survival on the market • targeting customers through the adequate communication channel *Competitor* • new competitors (with new business models) arise *Market position* • radical transformation of industries possible
Process-orientation	• faster processes • streamlined processes • more flexible processes • optimization of internal workflows • improved resource allocation • fully-integrated value chain • increase in efficiency	• increased complexity • need for continuous development • established processes must be transformed as soon as possible • breaking up old structures • comprehensive knowledge of the process landscape is needed • managing and matching multiple interfaces between information systems
Technology-orientation	• higher quality throughout the value chain • comprehensively optimized business activities	• missing know-how concerning the application of information systems • benefit of new technologies is not predictable • high initial effort to build up IT infrastructure • internal organization of diverse IT systems • high investment costs • development of a legal framework for use and exchange data • development of standards and a common language between companies
Product-orientation	• individualization (lot size one) • improved product-service	• non-intuitive, high quality products need to be explained • reduced life cycle of products • simultaneously managing the interconnection of product's hardware and software
Company-orientation	• business models improvement will lead to higher profitability • intensified collaboration among employees • increase in transparency • reduced resource-input • achievement of both monetary and time savings	*People* • corporate culture and transformation must interlock • informing employees about digital transformation and its consequences • foster acceptance among employees • face resistance and fear among employees • changing the digital mind-set of employees

Appendix - G: Main drivers of Digital Transformation Source: Stief, S., et al. (2016)

Appendix – H – Saunders' Research Onion



Adapted from Saunders' Research Onion (2007)

Appendix – I – Survey: Digital Maturity Assessment Questionnaire

Question number	Respondent Qualifier

Qualifier 1	Gender
Qualifier 1_1	Male
Qualifier 1_2	Female
Qualifier 1_3	Not specified
Qualifier 2	Age
Qualifier 2_1	16-30
Qualifier 2_2	31-45
Qualifier 2_3	46-60
Qualifier 2_4	60+
Qualifier 3	English Language Proficiency
Qualifier 3_1	No basic knowledge
Qualifier 3_2	Beginner
Qualifier 3_3	Intermediate
Qualifier 3_4	Advanced
Qualifier 3_5	No basic knowledge
Qualifier 4	Highest Education Levels
Qualifier 4_1	No Matric
Qualifier 4_2	Matric
Qualifier 4_3	Diploma
Qualifier 4_4	Bachelor's Degree
Qualifier 4_5	Honors/Post Graduate Degree
Qualifier 4_6	Master's Degree

Qualifier 4_7	Doctoral Degree
Qualifier 5	Work Experience in Banking
Qualifier 5_1	0-5
Qualifier 5_2	6-10
Qualifier 5_3	11-15
Qualifier 5_4	16-20
Qualifier 5_5	20+
Qualifier 5_6	0-5
Qualifier 6	Current job function
Qualifier 6_1	Manager
Qualifier 6_2	Analyst
Qualifier 6_3	Other
Qualifier 6_4	Senior Manager
Qualifier 6_5	Head of Business Area
Qualifier 6_6	Project Manager
Qualifier 6_7	Chief Level Executive (eg: Chief Digital Officer)
Qualifier 6_8	Executive
Qualifier 6_9	Manager
Qualifier 6_10	Analyst
Qualifier 7	Understanding of Digital Maturity in Banking
Qualifier 7_1	I have no understanding of Digital Maturity and its relevance to Banking
Qualifier 7_2	I have theoretically researched George Westerman's Leading Digital Framework prior to taking the survey and am able to contextualize Digital Maturity in Banking

	Qualifier 7_3	I have theoretically researched George Westerman's Leading Digital Framework prior to taking the survey as well as share prior working experience in Digital Maturity. I am also able to contextualize Digital Maturity in Banking
VISION AND INTENT	Q1 - Senior executives and the Board have a transformative vision of the Digital future of the Firm	
	1	Completely Disagree
	2	Strongly Disagree
	3	Disagree
	4	Neither Agree nor Disagree
	5	Agree
	6	Strongly Agree
	7	Completely Agree
	Q2 - Please select the most appropriate response for your organization that describes your current transformation objectives:	
	1	Our objectives are narrowly targeted in a limited number of specific areas such as the Digital workplace and improving operations
	2	Our objectives include re-thinking and re-designing our business processes as well as several coordinated initiatives related to the Digital customer experience
	3	Our objectives encompass re-thinking and re-designing our business models and processes and we are pursuing a mastery of the Digital customer experience
	4	Our objectives do not consider Digital Transformation
	Q3 - Senior executives and middle managers share a common vision of the Digital future of our company and the Digital Transformation journey to get there	
	1	Completely Disagree
	2	Strongly Disagree
	3	Disagree
	4	Neither Agree nor Disagree
	5	Agree
	6	Strongly Agree
	7	Completely Agree
	Q4 - The Digital Transformation vision incorporates both customer experience priorities and internal operations	
	1	Completely Disagree
	2	Strongly Disagree
	3	Disagree

4	Neither Agree nor Disagree
5	Agree
6	Strongly Agree
7	Completely Agree
Q5 - The vision is well integrated into the core strategy of our organization	
1	Completely Disagree
2	Strongly Disagree
3	Disagree
4	Neither Agree nor Disagree
5	Agree
6	Strongly Agree
7	Completely Agree
Q6 - The senior leadership in our organisation are tech-savvy. They are aware of technology developments and use new technology products comfortably in their daily and personal lives	
1	Completely Disagree
2	Strongly Disagree
3	Disagree
4	Neither Agree nor Disagree
5	Agree
6	Strongly Agree
7	Completely Agree
Q7 - Please select the most appropriate response for your organization that corresponds to your current leadership approach	
1	Our leadership makes Digital Transformation a key consideration, but Digital initiatives are still loosely-coordinated and aligned with one another
2	Our leadership makes Digital Transformation a necessity, and we pursue Digital initiatives in a well-coordinated manner
3	Our leadership makes Digital Transformation a necessity, enforces behaviors, and keeps programs chartered and aligned with the external perspective in mind
Q8 - Please select the most appropriate response for your organization that describes the overall priority of your Digital Transformation initiatives:	
1	It is not among our top 3 priorities
2	It is among our top 3 CEO-level priorities
3	It is among our top 3 Board-level priorities

CULTURE AND ENGAGEMENT		
	Q9 - Please select the most appropriate response for your organization that describes your current culture and appetite for risk related to new Digital initiatives	
	1	We have a risk averse culture that somewhat inhibits innovation and experimentation
	2	We have a risk tolerant culture that supports innovation and experimentation
	3	We have a risk receptive culture that encourages innovation and experimentation
	Q10 - To what extent do you tolerate failure and encourage risk-taking?	
	1	Failure is not an option (NASA) and is a Career Limiting Move (CLM)
	2	Failure and Risk are encouraged, but in name only and not tracked or quantified
	3	Failure and risk-taking are allowed and measured, but sandboxed in Skunkworks or very defined boundaries (e.g. Lockheed skunkworks).
	4	Failure and risk-taking are expected, pervasive, measured and even celebrated across the organization (e.g. Amazon, Google, PandG Heroic Failure Award)
	Q11 - Please rate the firm in terms of the following behaviors	
	Q11.1 - We actively promote data-driven decision making	
	1	Completely Disagree
	2	Strongly Disagree
	3	Disagree
	4	Neither Agree nor Disagree
	5	Agree
	6	Strongly Agree
	7	Completely Agree
	Q11.2 - We actively promote the exploration of new ideas and experimentation at all levels	
	1	Completely Disagree
	2	Strongly Disagree
	3	Disagree
	4	Neither Agree nor Disagree
	5	Agree
	6	Strongly Agree
	7	Completely Agree
	Q11.3 - Leadership is adopting new behaviors required for Digital Transformation	

1	Completely Disagree
2	Strongly Disagree
3	Disagree
4	Neither Agree nor Disagree
5	Agree
6	Strongly Agree
7	Completely Agree
Q11.4 - We encourage rapid and independent decision making	
1	Completely Disagree
2	Strongly Disagree
3	Disagree
4	Neither Agree nor Disagree
5	Agree
6	Strongly Agree
7	Completely Agree
Q11.5 - Employees can collaborate Digitally with other employees as needed	
1	Completely Disagree
2	Strongly Disagree
3	Disagree
4	Neither Agree nor Disagree
5	Agree
6	Strongly Agree
7	Completely Agree
Q11.6 - Employees actively share their knowledge through collaborative Digital platforms (e.g., Slack, Jira, Skype, Microsoft Teams)	
1	Completely Disagree
2	Strongly Disagree
3	Disagree
4	Neither Agree nor Disagree
5	Agree
6	Strongly Agree
7	Completely Agree
Q11.7 - Digital technologies improve communication between senior executives and employees	
1	Completely Disagree
2	Strongly Disagree
3	Disagree

	4	Neither Agree nor Disagree
	5	Agree
	6	Strongly Agree
	7	Completely Agree
	Q11.8 - We reward the behaviors that comprise our desired Digital culture, like data-driven decision making or Digital-first mindset	
	1	Completely Disagree
	2	Strongly Disagree
	3	Disagree
	4	Neither Agree nor Disagree
	5	Agree
	6	Strongly Agree
	7	Completely Agree
	Q11.9 - To help bring about a culture shift, we ensure we are giving continuous feedback on our employees: performance, especially when we expect them to do things in a different way than they are doing today.	
	1	Completely Disagree
	2	Strongly Disagree
	3	Disagree
	4	Neither Agree nor Disagree
	5	Agree
	6	Strongly Agree
	7	Completely Agree
	Q12 - Please select the most appropriate response for your organization that describes your change management capability:	
	1	We have limited and/or fragmented change management capabilities across the organization
	2	We have a formal enterprise-wide change management capability, but have not yet fine-tuned it for our Digital Transformation initiatives
	3	We have a formal enterprise-wide change management capability, which has been fine-tuned for the broader and deeper change impacts brought about by Digital Transformation initiatives
GOVERNANCE AND	Q13 - Please select the most appropriate response for your organization that describes your Digital governance structures	
	1	We have limited and/or fragmented organizational structures for Digital governance

2	We have some organizational structures for Digital governance, such as committees or individual roles, but are not yet addressing all our traditional silos
3	We have well-established organizational structures for Digital governance which include specialized committees as well as individual roles
Q14 - Coordination: The initiatives are coordinated across silos (Divisions, BUs, functions)	
1	Completely Disagree
2	Strongly Disagree
3	Disagree
4	Neither Agree nor Disagree
5	Agree
6	Strongly Agree
7	Completely Agree
Q15 - Roles and Responsibilities: Roles and responsibilities for governing Digital interventions or initiatives are well defined and understood	
1	Completely Disagree
2	Strongly Disagree
3	Disagree
4	Neither Agree nor Disagree
5	Agree
6	Strongly Agree
7	Completely Agree
Q16 - KPIs 1: Digital Initiatives are assessed through a common set of KPIs	
1	Completely Disagree
2	Strongly Disagree
3	Disagree
4	Neither Agree nor Disagree
5	Agree
6	Strongly Agree
7	Completely Agree
Q17 - KPIs 2: We have adjusted the role descriptions and KPIs to align with our Digital Transformation objectives	
1	Completely Disagree
2	Strongly Disagree
3	Disagree
4	Neither Agree nor Disagree
5	Agree

6	Strongly Agree
7	Completely Agree
Q18 - Please rate the IT-Business alignment of the organisation	
1	The IT unit's performance meets the needs of the company
2	Business and IT leaders work together as partners
3	The CIO, IT, and business teams are all aligned with the objectives of the program
4	Our business functions and IT departments work with each other and their objectives are aligned
Q19 - Assess the firm in terms of the following Organisational attributes and behaviors	
19.1	We have a flexible workplace
1	Completely Disagree
2	Strongly Disagree
3	Disagree
4	Neither Agree nor Disagree
5	Agree
6	Strongly Agree
7	Completely Agree
19.2	We have an open and flat organisation and culture.
1	Completely Disagree
2	Strongly Disagree
3	Disagree
4	Neither Agree nor Disagree
5	Agree
6	Strongly Agree
7	Completely Agree
19.3	We actively work with a wide ecosystem of partners (start-ups, incubators, technology firms, competitors) to co-develop solutions
1	Completely Disagree
2	Strongly Disagree
3	Disagree
4	Neither Agree nor Disagree
5	Agree
6	Strongly Agree
7	Completely Agree
19.4	It is quite easy to self-organize cross-functional teams throughout our organization

	1	Completely Disagree
	2	Strongly Disagree
	3	Disagree
	4	Neither Agree nor Disagree
	5	Agree
	6	Strongly Agree
	7	Completely Agree
	Q20 - Structure: Does your organization operate with large, hierarchical structures or small, multi-disciplinary, self-organizing teams?	
	1	Traditional corporate hierarchy with large, specialized groups operating in silos.
	2	Some small, multi-disciplinary teams operating at the edges, away from the core.
	3	Some small, multi-disciplinary teams accepted and embraced within the core organization.
	4	Small, multi-disciplinary, networked, self-organizing teams are the primary operating structure across the organization.
	Q21 - Decision Making: To what extent is authority/decision making decentralized?	
	1	Our organization uses traditional, top-down command and control.
	2	Decentralized decision-making happens in RandD, innovation and product development.
	3	Decentralized decision-making happens in all customer-facing areas like marketing, sales, etc.
	4	All key decisions are decentralized (except purpose, culture and vision).
NEW VALUE STREAMS AND BUSINESS MODELS	Q22 - Please select the most appropriate response for your organization that describes your use of platform business models	
	1	We have no current use or plans for platform business models
	2	We are actively investigating platform business models and their technical architectures
	3	Platform business models are already a core part of our Digital Transformation strategy
	Q23 - Please select the most appropriate response for your organization that describes your investment approach towards platform business models	
	1	We do not invest in new business models
	2	We make small and sporadic investments in new business models

	3	We actively invest significantly in new business models in a deliberate and structured way
	Q24 - Please select the most appropriate response for your organization that describes your use and experimentation of platform business models	
	1	We have not considered or experimented with new ways of "packaging", pricing or selling our offerings
	2	We have experimented with new business models and new ways of "packaging", pricing or selling but have not move to scaling these experiments up or making them new ways of doing business
	3	We have launched some new business models and new ways of "packaging", pricing and selling or these are now a small part of our revenue mix
	4	We have launched new business models and new ways of "packaging", pricing or selling and these are now a major part of our revenue mix
	5	Our business is based entirely on new business models and new ways of "packaging", pricing or selling
	Q25 - Innovation: Please select the most appropriate response for your organization that describes your program	
	1	We have limited and/or fragmented innovation programs across the organization
	2	We have a formal enterprise-wide innovation program, but have not yet tuned it for our Digital Transformation objectives
	3	We have a formal enterprise-wide innovation program, which has been fine-tuned for our Digital Transformation objectives, and which enables continuous and collaborative innovation
INNOVATION AND INVESTMENT	Q26 - Please select the most appropriate response for your organization that describes your current level of investment allocated to Digital Transformation	
	1	We have little or no investment specifically allocated to Digital Transformation
	2	We have investments allocated to short-, medium- and long-term horizons, including several focused on Digital Transformation
	3	We have major investments specifically allocated to Digital Transformation
	Q27 - How is internal innovation pursued in the organisation	

1	Innovation is not deliberately pursued and only happens by chance or because of individual persistence
2	Innovation processes are linear, traditional and "waterfall" in nature
3	Lean Innovation / Lean-startup is spoken about and occasionally pursued, but in silos and inconsistently
4	Lean Innovation / Lean stump methodologies are the organisation-wide approach to innovation and are actively encouraged and pursued
Q28 - Which metrics do you track about your organization and your product innovation portfolio? (e.g. Lean Startup Analytics)	
1	Only traditional KPIs monthly/quarterly/annually (e.g. sales, costs, profits).
2	Some real-time, traditional metrics from transactional systems like ERP.
3	All real-time, traditional metrics and use some Lean Startup metrics
4	All real-time traditional metrics and Lean Startup (value and learning) like repeat usage, monetization, referral and NPS
Q29 - We have a clear view of how much of our current business (revenue, profit) is likely to be disrupted in the short, medium and long term?	
1	Completely Disagree
2	Strongly Disagree
3	Disagree
4	Neither Agree nor Disagree
5	Agree
6	Strongly Agree
7	Completely Agree
Q30 - We have determined how much we need to be investing now to prepare for these future disruptions to our existing business	
1	Completely Disagree
2	Strongly Disagree
3	Disagree
4	Neither Agree nor Disagree
5	Agree
6	Strongly Agree
7	Completely Agree

CUSTOMER ORIENTATION AND ENGAGEMENT	Q31 - Customer Centricity: Please select the most appropriate response for your organization that describes your current approach to customer-centricity in your transformation journeys	
	1	It drives some of our initiatives, but is inconsistently and irregularly applied
	2	It drives and informs most of our initiatives, and provides a regular touchstone for focus
	3	It drives all of our initiatives and we continuously adjust based on changing demands
	Q32 - Please describe the firm in terms of how it is using technology and "Digital" methodologies to understand and engage with customers	
	Q32.1 - We use analytics to better segment our customers	
	1	Completely Disagree
	2	Strongly Disagree
	3	Disagree
	4	Neither Agree nor Disagree
	5	Agree
	6	Strongly Agree
	7	Completely Agree
	Q32.2 - We regularly conduct customer research to update our understanding of the needs and behaviors of our customers	
	1	Completely Disagree
	2	Strongly Disagree
	3	Disagree
	4	Neither Agree nor Disagree
	5	Agree
	6	Strongly Agree
	7	Completely Agree
	Q32.3 - We use Digital channels (such as online, social media and mobile to market our products and services	
	1	Completely Disagree
	2	Strongly Disagree
	3	Disagree
	4	Neither Agree nor Disagree
	5	Agree
	6	Strongly Agree
	7	Completely Agree
	Q32.4 - We use Digital channels to sell	

1	Completely Disagree
2	Strongly Disagree
3	Disagree
4	Neither Agree nor Disagree
5	Agree
6	Strongly Agree
7	Completely Agree
Q32.5 - We test promising ideas quickly as proof of concept/minimum products	
1	Completely Disagree
2	Strongly Disagree
3	Disagree
4	Neither Agree nor Disagree
5	Agree
6	Strongly Agree
7	Completely Agree
Q32.6 - We use Digital technologies to integrate different channels together	
1	Completely Disagree
2	Strongly Disagree
3	Disagree
4	Neither Agree nor Disagree
5	Agree
6	Strongly Agree
7	Completely Agree
Q32.7 - We have implemented AI to improve the customer experience	
1	Completely Disagree
2	Strongly Disagree
3	Disagree
4	Neither Agree nor Disagree
5	Agree
6	Strongly Agree
7	Completely Agree
Q32.8 - We use IoT technologies to understand customer usage patterns of products and services	
1	Completely Disagree
2	Strongly Disagree
3	Disagree
4	Neither Agree nor Disagree

	5	Agree
	6	Strongly Agree
	7	Completely Agree
	Q32.9 - We use IoT technologies to provide pre-emptive customer service remotely/on site	
	1	Completely Disagree
	2	Strongly Disagree
	3	Disagree
	4	Neither Agree nor Disagree
	5	Agree
	6	Strongly Agree
	7	Completely Agree
WORKFORCE ENABLEMENT AND SKILLS	Q33 - How do you actively convert a/the crowd (general employees) into Community members?	
	1	Standard techniques like internal PR to increase awareness
	2	Leveraging social media for internal communication and engagement purposes
	3	Gamification and incentive competitions
	4	Our systems and processes are inherently designed to convert crowd into Community.
	Q34 - How do you engage your Staff as a Community?	
	1	No engagement beyond standard Human Capital services (e.g. traditional HCM).
	2	Community is centralized and communication is one-to-many
	3	Community is decentralized and communication is many-to-many but passive and single purpose (e.g. LinkedIn, Facebook).
	4	Community is decentralized, communication is many-to-many and drives peer-to-peer value creation
	Q35 - Empowering Digital Talent: Please rate the firm in terms of how you treat modern ("Digital") talent	
	Q35.1 - Employees take ownership in the operational implementation of new and innovative ideas	
	1	Completely Disagree
	2	Strongly Disagree
	3	Disagree
	4	Neither Agree nor Disagree
	5	Agree
	6	Strongly Agree
	7	Completely Agree

Q35.2 - Employees do not have to deal with bureaucracy to submit ideas	
1	Completely Disagree
2	Strongly Disagree
3	Disagree
4	Neither Agree nor Disagree
5	Agree
6	Strongly Agree
7	Completely Agree
Q35.3 - We provide Digital talent the required tools to collaborate	
1	Completely Disagree
2	Strongly Disagree
3	Disagree
4	Neither Agree nor Disagree
5	Agree
6	Strongly Agree
7	Completely Agree
Q36 - Please select the most appropriate response for your organization that describes your current level and distribution of Digital skills	
1	We have limited Digital skills distributed across various tactical areas
2	We have moderate Digital skills located in some strategic areas or initiatives
3	We have strong Digital skills embedded in all strategic areas and programs
Q37 - Learning and Development 1: Please rate the firm in terms of how your acquire and develop talent	
Q37.1 - We use HR analytics to understand employee preferences (e.g., career development, training)	
1	Completely Disagree
2	Strongly Disagree
3	Disagree
4	Neither Agree nor Disagree
5	Agree
6	Strongly Agree
7	Completely Agree
Q37.2 - We use HR analytics to identify the skills needed both today and into the future	
1	Completely Disagree

2	Strongly Disagree
3	Disagree
4	Neither Agree nor Disagree
5	Agree
6	Strongly Agree
7	Completely Agree
Q37.3 - Upskilling/reskilling on Digital skills is a top priority for our company	
1	Completely Disagree
2	Strongly Disagree
3	Disagree
4	Neither Agree nor Disagree
5	Agree
6	Strongly Agree
7	Completely Agree
Q37.4 - Leadership actively promotes Digital skills learning and development for our employees	
1	Completely Disagree
2	Strongly Disagree
3	Disagree
4	Neither Agree nor Disagree
5	Agree
6	Strongly Agree
7	Completely Agree
Q37.5 - We actively recruit and hire new talent with strong Digital skills	
1	Completely Disagree
2	Strongly Disagree
3	Disagree
4	Neither Agree nor Disagree
5	Agree
6	Strongly Agree
7	Completely Agree
Q37.6 - We have a formal program for Digital reskilling employees (e.g., training, mentoring)	
1	Completely Disagree
2	Strongly Disagree
3	Disagree
4	Neither Agree nor Disagree
5	Agree
6	Strongly Agree

	7	Completely Agree
	Q38 - Learning and Development 2: Please rate the firm in terms of how your acquire and develop talent	
	Q38.1 - We know which new skills we need to develop in the next 3-5 years	
	1	Completely Disagree
	2	Strongly Disagree
	3	Disagree
	4	Neither Agree nor Disagree
	5	Agree
	6	Strongly Agree
	7	Completely Agree
	Q38.2 - We have the necessary learning infrastructure to upskill our employees	
	1	Completely Disagree
	2	Strongly Disagree
	3	Disagree
	4	Neither Agree nor Disagree
	5	Agree
	6	Strongly Agree
	7	Completely Agree
	Q38.3 - We create an environment that prioritizes and reward learning and establish a supportive and cooperative atmosphere	
	1	Completely Disagree
	2	Strongly Disagree
	3	Disagree
	4	Neither Agree nor Disagree
	5	Agree
	6	Strongly Agree
	7	Completely Agree
OPERATIONS AND CORE BUSINESS PROCESSES	Q39 - Do you use some variant of Objectives and Key Results (OKRs) to track individual/team performance?	
	1	No, we use traditional quarterly/annual performance reviews or 360 reviews or stack ranking.
	2	In innovation areas or at the edges of the organization.
	3	Yes, across our organization (e.g. LinkedIn).
	4	Yes, across our organization with full transparency (e.g. Google - everyone can view each others' performance).

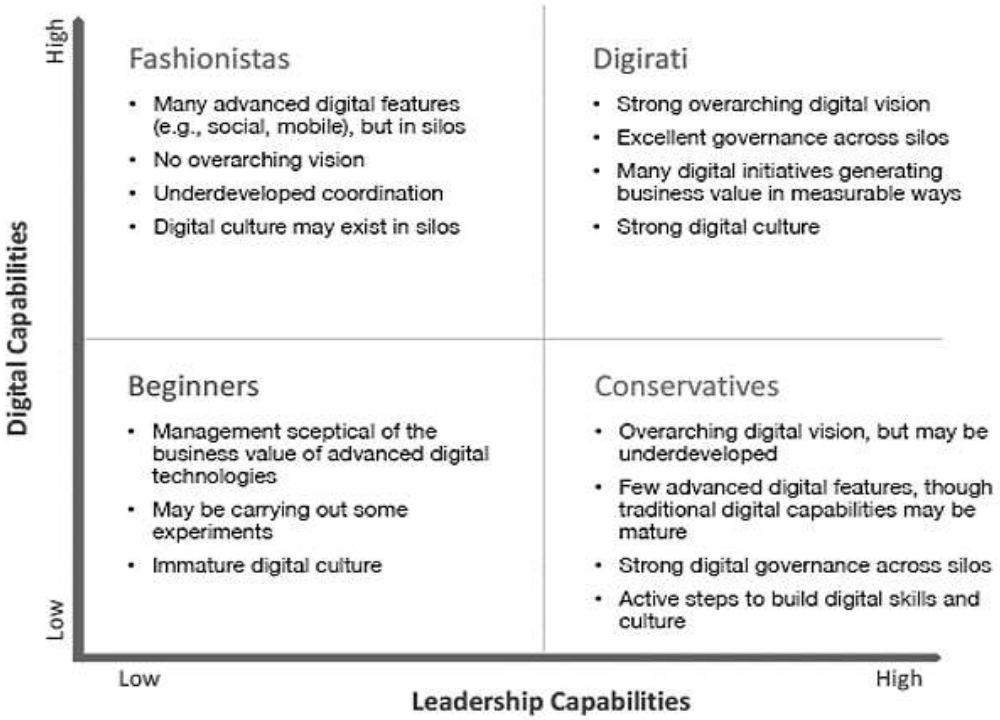
Q40 - Does your organization constantly optimize processes through experimentation, A/B testing and short feedback loops? (e.g. Lean Startup methodology)	
1	No, we use traditional business process management (BPM).
2	We use the Lean approach (or similar) for customer facing areas like marketing.
3	We use the Lean approach for product innovation and product development.
4	We use the Lean approach for all core functions (innovation, marketing, sales, service, HR, even legal!).
Q41 - To what extent do you use algorithms and machine learning to make meaningful decisions?	
1	We don't do any meaningful analysis
2	We collect and analyze data mostly via reporting systems
3	We use machine Learning algorithms to analyze data and drive actionable decisions
4	Our products and services are built around algorithms and machine learning
Q42 - Please assess the firm in terms of how Digital Technologies are integrated into Operations	
Q42.1 - Digital technology is allowing us to link customer-facing and operational processes in new ways	
1	Completely Disagree
2	Strongly Disagree
3	Disagree
4	Neither Agree nor Disagree
5	Agree
6	Strongly Agree
7	Completely Agree
Q42.2 - We are constantly identifying innovations in our value chain due to Digital technologies	
1	Completely Disagree
2	Strongly Disagree
3	Disagree
4	Neither Agree nor Disagree
5	Agree
6	Strongly Agree
7	Completely Agree

	Q42.3 - We have an integrated view of customer and operational information	
	1	Completely Disagree
	2	Strongly Disagree
	3	Disagree
	4	Neither Agree nor Disagree
	5	Agree
	6	Strongly Agree
	7	Completely Agree
	Q42.4 - We use Digital technologies to increase the performance or customer value of our existing products and services	
	1	Completely Disagree
	2	Strongly Disagree
	3	Disagree
	4	Neither Agree nor Disagree
	5	Agree
	6	Strongly Agree
	7	Completely Agree
	Q42.5 - We have implemented AI into our operations	
	1	Completely Disagree
	2	Strongly Disagree
	3	Disagree
	4	Neither Agree nor Disagree
	5	Agree
	6	Strongly Agree
	7	Completely Agree
	Q42.6 - We have implemented IoT technologies into our operations	
	1	Completely Disagree
	2	Strongly Disagree
	3	Disagree
	4	Neither Agree nor Disagree
	5	Agree
	6	Strongly Agree
	7	Completely Agree
TECHNOLOGY AND DATA	Q43 - Products and Services. To what extent are your products/services information based?	
	1	Product/services are physical in nature.
	2	Products/services are physical, but their delivery and/or production is information-based (e.g. Amazon)

3	Products/services are physical, but services are information based and revenue generating (e.g. iPhone/App store).
4	Entirely information-based (e.g. LinkedIn, Facebook, Spotify, Netflix).
Q44 - Products and Services 2: To what extent is Social functionality and collaboration a central element of your product/service offering?	
1	None of these aspects is designed into our products/services (e.g. buying a lawnmower).
2	These structures are bolted onto existing products/services (e.g products have a Facebook page or Twitter feed).
3	This functionality is used to enhance or deliver product/service offerings (e.g. 99Designs, Indiegogo, Taskrabbit).
4	These inputs actually build our products/services offering (e.g. Yelp, Waze, Foursquare).
Q45 - Data as an asset. Do you share strategic data assets internally across the company or expose them externally to your community?	
1	We don't share data, even between departments
2	Data shared between departments (i.e. use internal dashboards, activity streams and wiki pages).
3	We expose some data to key suppliers (e.g. EDI interfaces or via APIs).
4	We expose some data to our external ecosystem via open APIs (e.g. Flickr, Google, Twitter, Ford).
Q46 - Social, mobile, analytics and cloud technologies: Please select the most appropriate response for your organization that describes your current use of emerging and disruptive technologies	
1	We occasionally use SMAC (social, mobile, analytics and cloud) technologies for our Digital business applications
2	We routinely use SMAC technologies as well as occasionally using next-generation enablers (such as the IoT and intelligent automation) for our Digital business applications
3	We routinely use SMAC technologies as well as a strategic set of next-generation enablers (such as the IoT and intelligent automation) for our Digital business applications

Q47 - The six key capabilities of Digital services mastery include: (1) Agile, (2) DevOps, (3) As-a-service Infrastructure, (4) Intelligent Automation, (5) Personas and context, and (6) Digital service management. Select the most appropriate response for your organization that describes your mastery of each of the six key capabilities in how you design, develop, deploy, manage and continually evolve Digital services	
1	We have a mastery of one or two of the key capabilities
2	We have a mastery of three or four of the key capabilities
3	We have a mastery of five or six of the key capabilities
Q48 - Knowledge sharing and exploitation: Do you use advanced social tools for knowledge-sharing, communication, coordination and/or collaboration?	
1	No, email is our primary communication vehicle.
2	Some teams use social tools, but not across the organization.
3	Most business units use social tools (and some external vendors/partners, though often unauthorized.
4	Use is mandated across the organization as policy.
Q49 - Please select the most appropriate response for your organization that describes your business results to date with Digital Transformation	
1	We have realized limited or no results to date
2	We have already realized incremental benefits
3	We have already realized transformational benefits

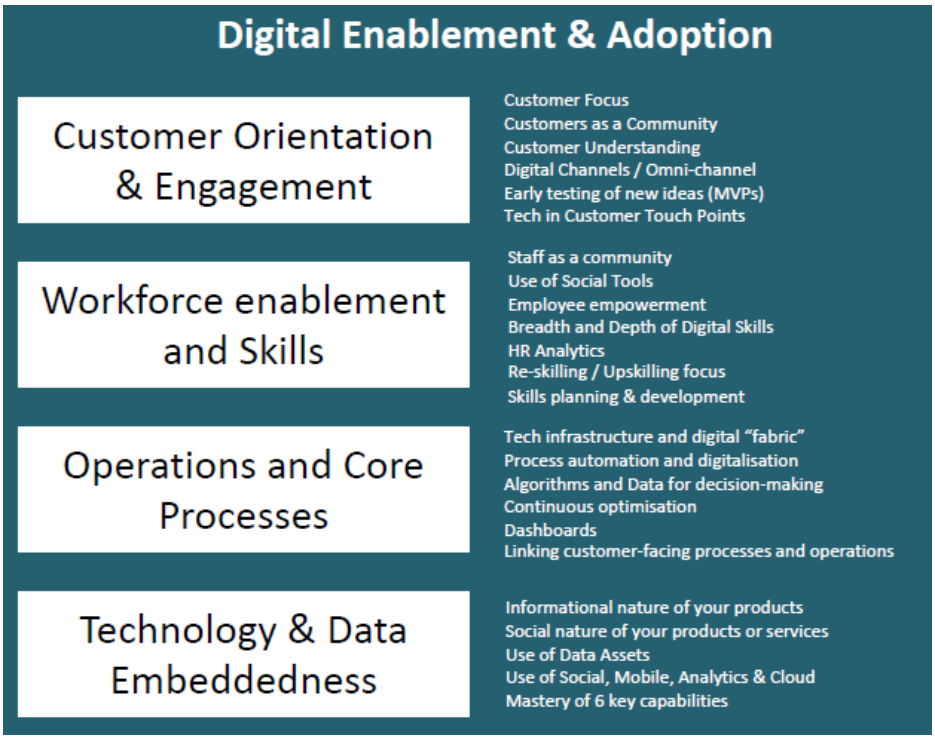
Appendix – J - Westerman's Leading Digital Framework and Extended Version



Adapted from Westerman, G., Bonnet, D., and McAfee, A., 2014. Leading Digital: Turning Technology into Business Transformation.



Adapted from: Armstrong, B. 2020. DTCM Session 2: Slide 4



Adapted from: Armstrong, B. 2020. DTCM Session 2: Slide 4

Appendix - K.1 – Digital Maturity Survey Results for Vision and Intent

- Bank A achieved a median score for all the questions relating to Vision and Intent, where respondents rated on the Likert scales, equated to 43.2%, the aggregate score across all Banks is 52.5%. This score is derived from the following scores.
    - Q1) Respondents support the view that Senior Executives and the Board does have a transformative vision of the Digital future of Bank. The median value for all respondents was calculated as 54.76%. The aggregate median-score across all Banks is 65.50% and the mode with the value of 6 appears more frequently than that of any other value.

- Q2) Respondents have rated the organisational objectives as being inclusive of re-thinking and re-designing of business processes as well as several coordinated initiatives related to Digital customer experience. The Bank achieved a weighting-score of 11.22% with a mode value of 2 that appears more frequently than that of any other value. The aggregate median-score across all Banks is 18.03% and the mode with the value of 2 appears more frequently that of any other value.
- Q3) Respondents provided disparate views of the alignment toward a common vision of Digital future and Digital Transformation journey, amongst senior executives and middle managers. This resulted in a median-score of 45.24%, with a mode value of 6 that appears more frequently than that of any other value. The aggregate median-score across all Banks is 57.30% and the mode with the value of 6 appears more frequently than that of any other value.
- Q4) Respondents were divided on the view that Digital Transformation vision incorporates both customer experience priorities and internal operations. The median-score for all respondent was calculated as 53.40% whilst the mode could not be determined. The aggregate median-score across all Banks is 68.52%.
- Q5) Respondents are assured of the vision being well integrated into the core strategy of the organisation. This resulted in a median-score of 49.66% and the mode with the value of 5 had appeared more frequently than that of any other value. The aggregate median-score across all Banks is 64.81% and the mode with the value of 5 appears more frequently than that of any other value.
- Q6) Respondents were not overly assured that senior leadership as tech-savvy or aware of technology developments and new

technology products in their daily lives. The median-score for all respondent was calculated as 42.52% and the mode with the value of 5 had appeared more frequently than that of any other value. The aggregate median-score across all Banks is 54.49% and the mode with the value of 5 appeared more frequently than that of any other value.

- Q7) Respondents believe senior leadership makes Digital Transformation a key consideration with loosely-coordinated initiatives. This resulted in a median-score of 21.42% and the mode with the value of 1 had appeared more frequently than that of any other value. The aggregate median-score across all Banks is 42.69% and the mode with the value of 2 appears more frequently than that of any other value.
- Q8) Respondents believe Digital Transformation is amongst top 3 CEO-level and / or Board-level priorities. The median-score for all respondent was calculated as 66.67% whilst the mode could not be determined. The aggregate median-score across all Banks is 62.22% and the mode with the value of 2 appeared more frequently than that of any other value.

- Bank B achieved a median value for all the questions relating to Vision and Strategy, where respondents rated on the Likert scales, equated to 55.0%, the aggregate score across all Banks is 52.5%. This value is derived from the following scores.
  - Q1) Respondents support the view that Senior Executives and the Board have a transformative vision of the Digital future of Bank. The median value for all respondents was calculated as 55.56% and the mode value of 6 that appears more frequently than that of any other value. The aggregate median-score across all Banks is 65.50% and the mode with the value of 6 appears more frequently than that of any other value.

- Q2) Respondents have rated the organisational objectives as being inclusive of re-thinking and re-designing of business processes as well as several coordinated initiatives related to Digital customer experience. The Bank achieved a weighting-score of 14.29% with a mode value of 2 that appears more frequently than that of any other value. The aggregate median-score across all Banks is 18.03% and the mode with the value of 2 appears more frequently that of any other value.
- Q3) Respondents provided aligned views of the alignment toward a common vision of Digital future and Digital Transformation journey, amongst senior executives and middle managers. This resulted in a median-score of 48.57%, with a mode value of 5 that appears more frequently than that of any other value. The aggregate median-score across all Banks is 57.30% and the mode with the value of 6 appears more frequently than that of any other value.
- Q4) Respondents are aligned on the view that Digital Transformation vision incorporates both customer experience priorities and internal operations. The median-score for all respondent was calculated as 73.33% whilst the mode could not be determined. The aggregate median-score across all Banks is 68.52% whilst the mode was could not be determined.
- Q5) Respondents are very assured of the vision being well-integrated into the core strategy of the organisation. This resulted in a median-score of 66.67% and the mode with the value of 6 had appeared more frequently than that of any other value. The aggregate median-score across all Banks is 64.81% and the mode with the value of 5 appears more frequently than that of any other value.
- Q6) Respondents were in agreement that senior leadership as tech-savvy or aware of technology developments and new technology

products in their daily lives. The median-score for all respondent was calculated as 53.33% and the mode could not be determined. The aggregate median-score across all Banks is 54.49% and the mode with the value of 5 appeared more frequently than that of any other value.

- Q7) Respondents strongly believe senior leadership makes Digital Transformation a necessity consideration with loosely-coordinated initiatives. This resulted in a median-score of 53.33% and the mode could not be determined. The aggregate median-score across all Banks is 42.69% and the mode with the value of 2 appears more frequently than that of any other value.
- Q8) Respondents strongly believe Digital Transformation is amongst top 3 CEO-level and / or Board-level priorities. The median-score for all respondent was calculated as 73.33% and the mode with the value of 3 appeared more frequently than that of any other value. The aggregate median-score across all Banks is 62.22% and the mode with the value of 2 appeared more frequently than that of any other value.

- Bank C achieved a median value for all the questions relating to Vision and Strategy, where respondents rated on the Likert scales, equated to 64.3.0%, the aggregate score across all Banks is 52.5%. This value is derived from the following scores.
  - Q1) Respondents strongly support the view that Senior Executives and the Board have a transformative vision of the Digital future of Bank. The median value for all respondents was calculated as 86.19% and the mode value of 7 that appears more frequently than that of any other value. The aggregate median-score across all

Banks is 65.50% and the mode with the value of 6 appears more frequently than that of any other value.

- Q2) Respondents have rated the organisational objectives as being inclusive of re-thinking and re-designing of business processes as well as several coordinated initiatives related to Digital customer experience. The Bank achieved a weighting-score of 28.57% with a mode value of 5 that appears more frequently than that of any other value. The aggregate median-score across all Banks is 18.03% and the mode with the value of 2 appears more frequently that of any other value.
- Q3) Responses provided aligned views of the alignment toward a common vision of Digital future and Digital Transformation journey, amongst senior executives and middle managers. This resulted in a median-score of 78.10%, with a mode value of 4 that appears more frequently than that of any other value. The aggregate median-score across all Banks is 57.30% and the mode with the value of 6 appears more frequently than that of any other value.
- Q4) Respondents are aligned on the view that Digital Transformation vision incorporates both customer experience priorities and internal operations. The median-score for all respondent was calculated as 78.84% whilst the mode with the value of 7 appears more frequently than that of any other value. The aggregate median-score across all Banks is 68.52% whilst the mode could not be determined.
- Q5) Respondents felt extremely assured of the vision being well integrated into the core strategy of the organisation. This resulted in a median-score of 78.10% and the mode could not be determined. The aggregate median-score across all Banks is 64.81% and the mode with the value of 5 appears more frequently than that of any other value.

- Q6) Respondents were in agreement that senior leadership as tech-savvy or aware of technology developments and new technology products in their daily lives. The median-score for all respondent was calculated as 67.62% and the mode with the value of 4 appears more frequently than that of any other value. The aggregate median-score across all Banks is 54.49% and the mode with the value of 5 appeared more frequently than that of any other value.
- Q7) Respondents strongly believe senior leadership makes Digital Transformation a necessity consideration with loosely-coordinated initiatives. This resulted in a median-score of 53.33% and the mode with the value of 2 appears more frequently than that of any other value. The aggregate median-score across all Banks is 42.69% and the mode with the value of 2 appears more frequently than that of any other value.
- Q8) Respondents partially believe Digital Transformation is amongst top 3 CEO-level and / or Board-level priorities. The median-score for all respondent was calculated as 46.67% and the mode with the value of 2 appeared more frequently than that of any other value. The aggregate median-score across all Banks is 62.22% and the mode with the value of 2 appeared more frequently than that of any other value.

Appendix - K.2 – Digital Maturity Survey Results for Culture and Engagement

- Bank A achieved a median value for all the questions relating to Culture and Engagement, where respondents rated on the Likert scales, equated to 38.4%, the aggregate score across all Banks is 45.0%. This value is derived from the following scores.

- Q9) Respondents strongly support the view that the organisation has a risk tolerant culture, supportive of innovation and experimentation. The median value for all respondents was calculated as 33.33% and the mode value of 2 that appears more frequently than that of any other value. The aggregate median-score across all Banks is 40.00% and the mode with the value of 2 appears more frequently than that of any other value.
- Q10) Respondents believe that failure and risk-taking are encouraged in name only and not tracked or qualified. The Bank achieved a weighting-score of 17.46% with a mode value of 2 that appears more frequently than that of any other value. The aggregate median-score across all Banks is 27.47% and the mode with the value of 2 appears more frequently that of any other value.
- Q11.1) Respondents are aligned on the view that the organisation actively promotes data-driven decision making. This resulted in a median-score of 44.90%, with a mode value of 5 that appears more frequently than that of any other value. The aggregate median-score across all Banks is 51.19% and the mode with the value of 6 appears more frequently than that of any other value.
- Q11.2) Respondents perceive that the organisation as actively promoting exploration of new ideas and experimentation of all levels. The median-score for all respondent was calculated as 41.16% whilst the mode could not be determined. The aggregate median-score across all Banks is 48.32% whilst the mode with the value of 5 appears more frequently than that of any other value.
- Q11.3) Respondents are divided on the views about leadership adopting new behaviours required for Digital Transformation. This resulted in a median-score of 39.19% and the mode with the value of 5 appears more frequently than that of any other value. The aggregate median-score across all Banks is 50.68% and the mode

with the value of 5 appears more frequently than that of any other value.

- Q11.4) Respondents believe the organisation does not encourage rapid and independent decision making. The median-score for all respondent was calculated as 29.25% and the mode with the value of 3 appears more frequently than that of any other value. The aggregate median-score across all Banks is 39.59% and the mode with the value of 5 appeared more frequently than that of any other value.
- Q11.5) Respondents strongly believe employees are able to collaborate Digitally with other employees. This resulted in a median-score of 53.74% and the mode with the value of 6 appears more frequently than that of any other value. The aggregate median-score across all Banks is 54.58% and the mode with the value of 6 appears more frequently than that of any other value.
- Q11.6) Respondents believe employees actively share their knowledge through collaborative Digital platforms. The median-score for all respondent was calculated as 52.38% and the mode with the value of 7 appeared more frequently than that of any other value. The aggregate median-score across all Banks is 50.84% and the mode with the value of 6 appeared more frequently than that of any other value.
- Q11.7) Respondents believe Digital technologies improves communication between senior executives and employees. The median-score for all respondent was calculated as 43.54% and the mode could not be determined. The aggregate median-score across all Banks is 53.56% and the mode could not be determined.
- Q11.8) Respondents view the organisation as rewarding behaviours that comprise our desired Digital culture, such as data-driven decision making or Digital first mind set. The median-score

for all respondent was calculated as 28.91% and the mode with the value of 4 appeared more frequently than that of any other value. The aggregate median-score across all Banks is 42.34% and the mode with the value of 5 appeared more frequently than that of any other value.

- Q11.9) Respondents support the view that the organisation ensures continuous feedback on employee feedback, especially when employees are expected to do things in a different way than usual. The median-score for all respondent was calculated as 30.27% and the mode with the value of 4 appeared more frequently than that of any other value. The aggregate median-score across all Banks is 47.39% and the mode with the value of 5 appeared more frequently than that of any other value.
- Q12) Respondents perceive that the organisation as having enterprise-wide change management capability, but have not yet fine-tuned Digital Transformation. The median-score for all respondent was calculated as 46.38% and the mode with the value of 2 appeared more frequently than that of any other value. The aggregate median-score across all Banks is 47.14% and the mode with the value of 2 appeared more frequently than that of any other value.

- Bank B achieved a median value for all the questions relating to Culture and Engagement, where respondents rated on the Likert scales, equated to 46.3%, the aggregate score across all Banks is 45.0%. This value is derived from the following scores.
  - Q9) Respondents support the view that the organisation has a risk tolerant culture, supportive of innovation and experimentation. The median value for all respondents was calculated as 33.33% and the mode value of 2 that appears more frequently than that of any other value. The aggregate median-score across all Banks is 40.00% and

the mode with the value of 2 appears more frequently than that of any other value.

- Q10) Respondents believe that failure and risk-taking are allowed and measured, but with defined boundaries. The Bank achieved a weighting-score of 26.67% with a mode value of 3 that appears more frequently than that of any other value. The aggregate median-score across all Banks is 27.47% and the mode with the value of 2 appears more frequently that of any other value.
- Q11.1) Respondents are believe the organisation actively promotes data-driven decision making. This resulted in a median-score of 52.38%, with a mode value of 5 that appears more frequently than that of any other value. The aggregate median-score across all Banks is 51.19% and the mode with the value of 6 appears more frequently than that of any other value.
- Q11.2) Respondents perceive that the organisation as actively promoting exploration of new ideas and experimentation of all levels. The median-score for all respondent was calculated as 41.16% whilst the mode with the value of 5 appears more frequently than that of any other value. The aggregate median-score across all Banks is 48.32% whilst the mode with the value of 5 appears more frequently than that of any other value.
- Q11.3) Respondents are aligned on the views about leadership adopting new behaviours required for Digital Transformation. This resulted in a median-score of 53.33% and the mode could not be determined. The aggregate median-score across all Banks is 50.68% and the mode with the value of 5 appears more frequently than that of any other value.
- Q11.4) Respondents strongly agree that the organisation does encourage rapid and independent decision making. The median-score for all respondent was calculated as 40.00% and the mode

with the value of 5 appears more frequently than that of any other value. The aggregate median-score across all Banks is 39.59% and the mode with the value of 5 appeared more frequently than that of any other value.

- Q11.5) Respondents believe employees are able to collaborate Digitally with other employees. This resulted in a median-score of 52.38% and the mode with the value of 5 appears more frequently than that of any other value. The aggregate median-score across all Banks is 54.58% and the mode with the value of 6 appears more frequently than that of any other value.
- Q11.6) Respondents are divided on the views that employees actively share their knowledge through collaborative Digital platforms. The median-score for all respondent was calculated as 39.05% and the mode could not be determined. The aggregate median-score across all Banks is 50.84% and the mode with the value of 6 appeared more frequently than that of any other value.
- Q11.7) Respondents strongly believe Digital technologies improves communication between senior executives and employees. The median-score for all respondent was calculated as 61.90% and the mode with the value of 6 appeared more frequently than that of any other value. The aggregate median-score across all Banks is 53.56% and the mode could not be determined.
- Q11.8) Respondents are aligned on view the organisation as rewarding behaviours that comprise our desired Digital culture, such as data-driven decision making or Digital first mind-set. The median-score for all respondent was calculated as 47.62% and the mode with the value of 5 appeared more frequently than that of any other value. The aggregate median-score across all Banks is 42.34% and the mode with the value of 5 appeared more frequently than that of any other value.

- Q11.9) Respondents strongly support the view that the organisation ensures continuous feedback on employee feedback, especially when employees are expected to do things in a different way than usual. The median-score for all respondent was calculated as 57.14% and the mode with the value of 5 appeared more frequently than that of any other value. The aggregate median-score across all Banks is 47.39% and the mode with the value of 5 appeared more frequently than that of any other value.
- Q12) Respondents perceive that the organisation as having enterprise-wide change management capability, but have not yet fine-tuned Digital Transformation. The median-score for all respondent was calculated as 40.00% and the mode with the value of 2 appeared more frequently than that of any other value. The aggregate median-score across all Banks is 47.14% and the mode with the value of 2 appeared more frequently than that of any other value.

- Bank C achieved a median value for all the questions relating to Culture and Engagement, where respondents rated on the Likert scales, equated to 53.6%, the aggregate score across all Banks is 45.0%. This value is derived from the following scores.
  - Q9) Respondents strongly support the view that the organisation has a risk tolerant culture, supportive of innovation and experimentation. The median value for all respondents was calculated as 53.33% and the mode value of 2 that appears more frequently than that of any other value. The aggregate median-score across all Banks is 40.00% and the mode with the value of 2 appears more frequently than that of any other value.
  - Q10) Respondents believe that failure and risk-taking are allowed and measured, but with defined boundaries. The Bank achieved a weighting-score of 38.27% with a mode value of 3 that appears

more frequently than that of any other value. The aggregate median-score across all Banks is 27.47% and the mode with the value of 2 appears more frequently that of any other value.

- Q11.1) Respondents strongly believe the organisation actively promotes data-driven decision making. This resulted in a median-score of 56.29%, with a mode value of 6 that appears more frequently than that of any other value. The aggregate median-score across all Banks is 51.19% and the mode with the value of 6 appears more frequently than that of any other value.
- Q11.2) Respondents perceive that the organisation as actively promoting exploration of new ideas and experimentation of all levels. The median-score for all respondent was calculated as 51.43% whilst the mode with the value of 6 appears more frequently than that of any other value. The aggregate median-score across all Banks is 48.32% whilst the mode with the value of 5 appears more frequently than that of any other value.
- Q11.3) Respondents are very aligned on the views about leadership adopting new behaviours required for Digital Transformation. This resulted in a median-score of 59.52% and the mode could not be determined. The aggregate median-score across all Banks is 50.68% and the mode with the value of 5 appears more frequently than that of any other value.
- Q11.4) Respondents agree that the organisation does encourage rapid and independent decision making. The median-score for all respondent was calculated as 49.52% and the mode with the value of 5 appears more frequently than that of any other value. The aggregate median-score across all Banks is 39.59% and the mode with the value of 5 appeared more frequently than that of any other value.

- Q11.5) Respondents believe employees are able to collaborate Digitally with other employees. This resulted in a median-score of 57.62% and the mode with the value of 6 appears more frequently than that of any other value. The aggregate median-score across all Banks is 54.58% and the mode with the value of 6 appears more frequently than that of any other value.
- Q11.6) Respondents are strongly aligned on the views that employees actively share their knowledge through collaborative Digital platforms. The median-score for all respondent was calculated as 61.09% and the mode with the value of 6 appeared more frequently than that of any other value. The aggregate median-score across all Banks is 50.84% and the mode with the value of 6 appeared more frequently than that of any other value.
- Q11.7) Respondents believe Digital technologies improves communication between senior executives and employees. The median-score for all respondent was calculated as 55.24% and the mode with the value of 5 appeared more frequently than that of any other value. The aggregate median-score across all Banks is 53.56% and the mode could not be determined.
- Q11.8) Respondents are aligned on view the organisation as rewarding behaviours that comprise our desired Digital culture, such as data-driven decision making or Digital first mind set. The median-score for all respondent was calculated as 50.48% and the mode with the value of 5 appeared more frequently than that of any other value. The aggregate median-score across all Banks is 42.34% and the mode with the value of 5 appeared more frequently than that of any other value.
- Q11.9) Respondents strongly support the view that the organisation ensures continuous feedback on employee feedback, especially when employees are expected to do things in a different way than

usual. The median-score for all respondent was calculated as 54.76% and the mode with the value of 5 appeared more frequently than that of any other value. The aggregate median-score across all Banks is 47.39% and the mode with the value of 5 appeared more frequently than that of any other value.

- Q12) Respondents perceive that the organisation as having enterprise-wide change management capability that has been fine-tuned for the broader and deeper change impacts brought about by the Digital Transformation initiatives. The median-score for all respondent was calculated as 55.00% and the mode with the value of 3 appeared more frequently than that of any other value. The aggregate median-score across all Banks is 47.14% and the mode with the value of 2 appeared more frequently than that of any other value.

Appendix - K.3 – Digital Maturity Survey Results for Governance and Organisation

- Bank A achieved a median value for all the questions relating to Governance and Organisation, where respondents rated on the Likert scales, equated to 44.1%, the aggregate score across all Banks is 40.3%. This value is derived from the following scores.
    - Q13) Respondents share the view that the organisation has some structures for Digital governance but are not yet addressing all traditional silos. The median value for all respondents was calculated as 45.24% and the mode value of 2 that appears more frequently than that of any other value. The aggregate median-score across all Banks is 61.75% and the mode could not be determined.

- Q14) Respondents could not agree that initiatives are coordination across business units and functions. The Bank achieved a weighting-score of 36.73% with a mode value of 4 that appears more frequently than that of any other value. The aggregate median-score across all Banks is 47.01% and the mode with the value of 5 appears more frequently that of any other value.
- Q15) Respondents agree that roles and responsibilities for governing Digital interventions or initiatives are well defined and understood. This resulted in a median-score of 31.63%, with a mode value of 4 that appears more frequently than that of any other value. The aggregate median-score across all Banks is 42.77% and the mode could not be determined.
- Q16) Respondents could not agree that Digital initiatives are assessed through a common set of KPI's. The median-score for all respondent was calculated as 29.93% whilst the mode with the value of 3 appears more frequently than that of any other value. The aggregate median-score across all Banks is 36.33% whilst the mode could not be determined.
- Q17) Respondents are not aligned on the views that job descriptions and KPI's are aligned with the organisational Digital Transformation objectives. This resulted in a median-score of 35.03% and the mode could not be determined. The aggregate median-score across all Banks is 35.80% and the mode with the value of 5 appears more frequently than that of any other value.
- Q18) Respondents are aligned on the view that business functions and IT departments work with each other and their objectives are aligned. The median-score for all respondent was calculated as 80.36% and the mode with the value of 4 appears more frequently than that of any other value. The aggregate median-score across all

Banks is 76.79% and the mode with the value of 4 appeared more frequently than that of any other value.

- Q19.1) Respondents are aligned on the view that the workplace is flexible. This resulted in a median-score of 57.82% and the mode with the value of 5 appears more frequently than that of any other value. The aggregate median-score across all Banks is 57.37% and the mode with the value of 5 appears more frequently than that of any other value.
- Q19.2) Respondents share the views that there is an open and flat organisational structure and culture. The median-score for all respondent was calculated as 59.52% and the mode could not be determined. The aggregate median-score across all Banks is 57.14% and the mode with the value of 5 appeared more frequently than that of any other value.
- Q19.3) Respondents tend to believe employees actively work with a wide ecosystem of partners, comprising start-ups, incubators, technology firms and competitors, to develop solutions. The median-score for all respondent was calculated as 46.26% and the mode with the value of 4 appeared more frequently than that of any other value. The aggregate median-score across all Banks is 47.48% and the mode with the value of 4 appeared more frequently than that of any other value.
- Q19.4) Respondents are unable to agree on the view that it is easy to self-organize cross-functional teams throughout the organisation. The median-score for all respondent was calculated as 43.20% and the mode with the value of 4 appeared more frequently than that of any other value. The aggregate median-score across all Banks is 50.11% and the mode could not be determined.
- Q20) Respondents are divided on the organisational structure as being either large with hierarchical structures or small with multi-

disciplinary self-organizing teams. The median-score for all respondent was calculated as 41.43% and the mode with the value of 1 appeared more frequently than that of any other value. The aggregate median-score across all Banks is 58.48% and the mode with the value of 3 appeared more frequently than that of any other value.

  - Q21) Respondents are broadly aligned on the view that the organisation uses a traditional, top-down command and control decision making system. The median-score for all respondent was calculated as 22.62% and the mode with the value of 1 appeared more frequently than that of any other value. The aggregate median-score across all Banks is 50.32% and the mode with the value of 1 appeared more frequently than that of any other value.

- Bank B achieved a median value for all the questions relating to Governance and Organisation, where respondents rated on the Likert scales, equated to 53.8%, the aggregate score across all Banks is 40.3%. This value is derived from the following scores.
  - Q13) Respondents are divided on the Digital governance structures of the organisation. The median value for all respondents was calculated as 60.00% and the mode value of 3 that appears more frequently than that of any other value. The aggregate median-score across all Banks is 61.75% and the mode could not be determined.
  - Q14) Respondents are aligned on the view that initiatives are coordination across business units and functions. The Bank achieved a weighting-score of 53.33% and the mode could not be determined. The aggregate median-score across all Banks is 47.01% and the mode with the value of 5 appears more frequently that of any other value.
  - Q15) Respondents agree that roles and responsibilities for governing Digital interventions or initiatives are well defined and

understood. This resulted in a median-score of 52.38% and the mode value of 5 that appears more frequently than that of any other value. The aggregate median-score across all Banks is 42.77% and the mode could not be determined.

- Q16) Respondents could not agree that Digital initiatives are assessed through a common set of KPI's. The median-score for all respondent was calculated as 35.24% whilst the mode with the value of 4 appears more frequently than that of any other value. The aggregate median-score across all Banks is 36.33% whilst the mode could not be determined.
- Q17) Respondents are not aligned on the views that job descriptions and KPI's are aligned with the organisational Digital Transformation objectives. This resulted in a median-score of 30.48% and the mode could not be determined. The aggregate median-score across all Banks is 35.80% and the mode with the value of 5 appears more frequently than that of any other value.
- Q18) Respondents are aligned on the view that business and IT leaders work together as partners. The median-score for all respondent was calculated as 70.00% and the mode with the value of 2 appears more frequently than that of any other value. The aggregate median-score across all Banks is 76.79% and the mode with the value of 4 appeared more frequently than that of any other value.
- Q19.1) Respondents are aligned on the view that the workplace is flexible. This resulted in a median-score of 57.14% and the mode with the value of 5 appears more frequently than that of any other value. The aggregate median-score across all Banks is 57.37% and the mode with the value of 5 appears more frequently than that of any other value.

- Q19.2) Respondents share the views that there is an open and flat organisational structure and culture. The median-score for all respondent was calculated as 57.14% and the mode with the value of 5 appeared more frequently than that of any other value. The aggregate median-score across all Banks is 57.14% and the mode with the value of 5 appeared more frequently than that of any other value.
- Q19.3) Respondents are undecided on the view that employees actively work with a wide ecosystem of partners, comprising start-ups, incubators, technology firms and competitors, to develop solutions. The median-score for all respondent was calculated as 44.76% and the mode could not be determined. The aggregate median-score across all Banks is 47.48% and the mode with the value of 4 appeared more frequently than that of any other value.
- Q19.4) Respondents are unable to agree on the view that it is easy to self-organize cross-functional teams throughout the organisation. The median-score for all respondent was calculated as 49.52% and the mode could not be determined. The aggregate median-score across all Banks is 50.11% and the mode could not be determined.
- Q20) Respondents are divided on the organisational structure as being either large with hierarchical structures or small with multi-disciplinary self-organizing teams. The median-score for all respondent was calculated as 76.00% and the mode with the value of 3 appeared more frequently than that of any other value. The aggregate median-score across all Banks is 58.48% and the mode with the value of 3 appeared more frequently than that of any other value.
- Q21) Respondents are undecided on the organisations approach towards authority and decision-making. The median-score for all respondent was calculated as 60.00% and the mode with the value

of 4 appeared more frequently than that of any other value. The aggregate median-score across all Banks is 50.32% and the mode with the value of 1 appeared more frequently than that of any other value.

- Bank C achieved a median value for all the questions relating to Governance and Organisation, where respondents rated on the Likert scales, equated to 57.4%, the aggregate score across all Banks is 40.3%. This value is derived from the following scores.
    - Q13) Respondents are divided on the Digital governance structures of the organisation. The median value for all respondents was calculated as 80.00% and the mode value of 3 that appears more frequently than that of any other value. The aggregate median-score across all Banks is 61.75% and the mode could not be determined.
    - Q14) Respondents are aligned on the view that initiatives are coordination across business units and functions. The Bank achieved a weighting-score of 50.95% and the mode with the value of 5 appears more frequently than that of any other value. The aggregate median-score across all Banks is 47.01% and the mode with the value of 5 appears more frequently than that of any other value.
    - Q15) Respondents are divided on the views that roles and responsibilities for governing Digital interventions or initiatives are well defined and understood. This resulted in a median-score of 44.29% and the mode could not be determined. The aggregate median-score across all Banks is 42.77% and the mode could not be determined.
    - Q16) Respondents could not agree that Digital initiatives are assessed through a common set of KPI's. The median-score for all respondent was calculated as 43.81% whilst the mode could not be

determined. The aggregate median-score across all Banks is 36.33% whilst the mode could not be determined.

- Q17) Respondents are not aligned on the views that job descriptions and KPI's are aligned with the organisational Digital Transformation objectives. This resulted in a median-score of 41.09% and the mode with the value of 5 appears more frequently than that of any other value. The aggregate median-score across all Banks is 35.80% and the mode with the value of 5 appears more frequently than that of any other value.
- Q18) Respondents agree with the view that CIO, IT and business teams are aligned in their objectives. The median-score for all respondent was calculated as 80.00% and the mode with the value of 2 appears more frequently than that of any other value. The aggregate median-score across all Banks is 76.79% and the mode with the value of 4 appeared more frequently than that of any other value.
- Q19.1) Respondents are aligned on the view that the workplace is flexible. This resulted in a median-score of 57.14% and the mode with the value of 5 appears more frequently than that of any other value. The aggregate median-score across all Banks is 57.14% and the mode with the value of 5 appears more frequently than that of any other value.
- Q19.2) Respondents share the views that there is an open and flat organisational structure and culture. The median-score for all respondent was calculated as 54.76% and the mode with the value of 5 appeared more frequently than that of any other value. The aggregate median-score across all Banks is 57.14% and the mode with the value of 5 appeared more frequently than that of any other value.

- Q19.3) Respondents are undecided on the view that employees actively work with a wide ecosystem of partners, comprising start-ups, incubators, technology firms and competitors, to develop solutions. The median-score for all respondent was calculated as 51.43% and with the value of 6 appeared more frequently than that of any other value. The aggregate median-score across all Banks is 47.48% and the mode with the value of 4 appeared more frequently than that of any other value.
- Q19.4) Respondents are aligned on the view that it is easy to self-organize cross-functional teams throughout the organisation. The median-score for all respondent was calculated as 57.62% and the mode with the value of 6 appeared more frequently than that of any other value. The aggregate median-score across all Banks is 50.11% and the mode could not be determined.
- Q20) Respondents are divided on the organisational structure as being either large with hierarchical structures or small with multi-disciplinary self-organizing teams. The median-score for all respondent was calculated as 58.00% and the mode with the value of 3 appeared more frequently than that of any other value. The aggregate median-score across all Banks is 58.48% and the mode with the value of 3 appeared more frequently than that of any other value.
- Q21) Respondents are undecided on the organisations approach towards authority and decision-making. The median-score for all respondent was calculated as 68.33% and the mode with the value of 4 appeared more frequently than that of any other value. The aggregate median-score across all Banks is 50.32% and the mode with the value of 1 appeared more frequently than that of any other value.

Appendix - K.4 – Digital Maturity Survey Results for New Value Streams and Business Models

- Bank A achieved a median value for all the questions relating to New Value Streams and Business Models, where respondents rated on the Likert scales, equated to 60.8%, the aggregate score across all Banks is 66.6%. This value is derived from the following scores.
    - Q22) Respondents are inclined towards the view that the view that the organisation use of platform business models. The median value for all respondents was calculated as 60.77% and the mode value of 2 that appears more frequently than that of any other value. The aggregate median-score across all Banks is 62.92% and the mode value of 2 that appears more frequently than that of any other value.
    - Q23) Respondents are aligned on the view that the organisation makes small and sporadic investments in new business models. The Bank achieved a weighting-score of 50.71% and the mode with the value of 2 appears more frequently than that of any other value. The aggregate median-score across all Banks is 83.571% and the mode with the value of 3 appears more frequently than that of any other value.
    - Q24) Respondents are divided on the views that the organisation uses and / or experiments with platform business models. This resulted in a median-score of 30.65% and the mode could not be determined. The aggregate median-score across all Banks is 47.58% and the mode with the value of 3 appears more frequently than that of any other value.
    - Q25) Respondents are divided on the views that the organisation experiments with innovation programs across the organisation. The median-score for all respondent was calculated as 30.95% whilst the mode with the value of 2 appears more frequently than that of

any other value. The aggregate median-score across all Banks is 56.98% whilst the mode with the value of 2 appears more frequently than that of any other value.

- Bank B achieved a median value for all the questions relating to New Value Streams and Business Models, where respondents rated on the Likert scales, equated to 40.0%, the aggregate score across all Banks is 66.6%. This value is derived from the following scores.
    - Q22) Respondents are inclined towards the view that the view that the organisation actively uses platform business models. The median value for all respondents was calculated as 40.00% and the mode value of 2 that appears more frequently than that of any other value. The aggregate median-score across all Banks is 62.92% and the mode value of 2 that appears more frequently than that of any other value.
    - Q23) Respondents are aligned on the view that the organisation actively invests significantly in new business models in a deliberate and structured way. The Bank achieved a weighting-score of 100% and the mode with the value of 3 appears more frequently than that of any other value. The aggregate median-score across all Banks is 83.57% and the mode with the value of 3 appears more frequently than that of any other value.
    - Q24) Respondents are not aligned on the views that the organisation uses and / or experiments with platform business models. This resulted in a median-score of 57.50% and the mode with the value of 3 appears more frequently than that of any other value. The aggregate median-score across all Banks is 47.58% and the mode with the value of 3 appears more frequently than that of any other value.
    - Q25) Respondents are divided on the views that the organisation experiments with innovation programs across the organisation. The

median-score for all respondent was calculated as 60.00% whilst the mode with the value of 2 appears more frequently than that of any other value. The aggregate median-score across all Banks is 56.98% whilst the mode with the value of 2 appears more frequently than that of any other value.

- Bank C achieved a median value for all the questions relating to New Value Streams and Business Models, where respondents rated on the Likert scales, equated to 88.0%, the aggregate score across all Banks is 66.6%. This value is derived from the following scores.
    - Q22) Respondents are aligned towards the view that platform business models are already a core part of the organisational Digital Transformation strategy. The median value for all respondents was calculated as 88.00% and the mode value of 3 that appears more frequently than that of any other value. The aggregate median-score across all Banks is 62.92% and the mode value of 2 that appears more frequently than that of any other value.
    - Q23) Respondents are aligned on the view that the organisation actively invests significantly in new business models in a deliberate and structured way. The Bank achieved a weighting-score of 100% and the mode with the value of 3 appears more frequently than that of any other value. The aggregate median-score across all Banks is 83.57% and the mode with the value of 3 appears more frequently than that of any other value.
    - Q24) Respondents are not aligned on the views that the organisation uses and / or experiments with platform business models. This resulted in a median-score of 54.58% and the mode with the value of 3 appears more frequently than that of any other value. The aggregate median-score across all Banks is 47.58% and the mode with the value of 3 appears more frequently than that of any other value.

- Q25) Respondents are divided on the views that the organisation experiments with innovation programs across the organisation. The median-score for all respondent was calculated as 68.00% whilst the mode with the value of 3 appears more frequently than that of any other value. The aggregate median-score across all Banks is 56.98% whilst the mode with the value of 2 appears more frequently than that of any other value.

Appendix - K.5 – Digital Maturity Survey Results for Investment and Innovation

- Bank A achieved a median value for all the questions relating to Investment and Innovation, where respondents rated on the Likert scales, equated to 35.7%, the aggregate score across all Banks is 60.9%. This value is derived from the following scores.
  - Q26) Respondents are aligned towards the view that the organisational has investments allocated to short-, medium-, and long-term horizons, including several focused on Digital Transformation. The median value for all respondents was calculated as 40.48% and the mode value of 2 that appears more frequently than that of any other value. The aggregate median-score across all Banks is 77.94% and the mode value of 3 that appears more frequently than that of any other value.
  - Q27) Respondents are not aligned on the view that internal innovation is pursued in the organisation. The Bank achieved a weighting-score of 38.10% and the mode with the value of 3 appears more frequently than that of any other value. The aggregate median-score across all Banks is 56.03% and the mode

with the value of 3 appears more frequently than that of any other value.

- Q28) Respondents are not aligned on the views that the organisation uses metrics for regular tracking of organisational and product innovation. This resulted in a median-score of 23.81% and the mode with the value of 1 appears more frequently than that of any other value. The aggregate median-score across all Banks is 22.94% and the mode with the value of 2 appears more frequently than that of any other value.
- Q29) Respondents are not aligned on the views that the organisation has a clear view of how much the current business is likely to be disrupted in the short-, medium- and long-term. The median-score for all respondent was calculated as 37.07% whilst the mode with the value of 4 appears more frequently than that of any other value. The aggregate median-score across all Banks is 47.44% whilst the mode with the value of 6 appears more frequently than that of any other value.
- Q30) Respondents are not aligned on the views that the organisation is determined how much is needed to be invested in preparation for future disruptions to existing business activities. The median-score for all respondent was calculated as 33.67% whilst the mode with the value of 4 appears more frequently than that of any other value. The aggregate median-score across all Banks is 47.10% whilst the mode with the value of 5 appears more frequently than that of any other value.

- Bank B achieved a median value for all the questions relating to Investment and Innovation, where respondents rated on the Likert scales, equated to 35.7%, the aggregate score across all Banks is 60.9%. This value is derived from the following scores.

- Q26) Respondents are aligned towards the view that the organisational has major investments specifically allocated to Digital Transformation. The median value for all respondents was calculated as 100% and the mode value of 3 that appears more frequently than that of any other value. The aggregate median-score across all Banks is 77.94% and the mode value of 3 that appears more frequently than that of any other value.
- Q27) Respondents are not aligned on the view that internal innovation is pursued in the organisation. The Bank achieved a weighting-score of 56.67% and the mode could not be determined. The aggregate median-score across all Banks is 56.03% and the mode with the value of 3 appears more frequently than that of any other value.
- Q28) Respondents are not aligned on the views that the organisation uses metrics for regular tracking of organisational and product innovation. This resulted in a median-score of 10.00% and the mode with the value of 2 appears more frequently than that of any other value. The aggregate median-score across all Banks is 22.94% and the mode with the value of 2 appears more frequently than that of any other value.
- Q29) Respondents are aligned on the views that the organisation has a clear view of how much the current business is likely to be disrupted in the short-, medium- and long-term. The median-score for all respondent was calculated as 57.14% whilst the mode with the value of 5 appears more frequently than that of any other value. The aggregate median-score across all Banks is 47.44% whilst the mode with the value of 6 appears more frequently than that of any other value.
- Q30) Respondents are aligned on the views that the organisation is determined how much is needed to be invested in preparation for

future disruptions to existing business activities. The median-score for all respondent was calculated as 57.14% whilst the mode with the value of 5 appears more frequently than that of any other value. The aggregate median-score across all Banks is 47.10% whilst the mode with the value of 5 appears more frequently than that of any other value.

- Bank C achieved a median value for all the questions relating to Investment and Innovation, where respondents rated on the Likert scales, equated to 86.7%, the aggregate score across all Banks is 60.9%. This value is derived from the following scores.
    - Q26) Respondents are aligned towards the view that the organisational has major investments specifically allocated to Digital Transformation. The median value for all respondents was calculated as 93.33% and the mode value of 3 that appears more frequently than that of any other value. The aggregate median-score across all Banks is 77.94% and the mode value of 3 that appears more frequently than that of any other value.
    - Q27) Respondents are aligned on the view that internal innovation is pursued in the organisation. The Bank achieved a weighting-score of 73.33% and the mode with the value of 3 appears more frequently than that of any other value. The aggregate median-score across all Banks is 56.03% and the mode with the value of 3 appears more frequently than that of any other value.
    - Q28) Respondents are not aligned on the views that the organisation uses metrics for regular tracking of organisational and product innovation. This resulted in a median-score of 35.00% and the mode with the value of 2 appears more frequently than that of any other value. The aggregate median-score across all Banks is 22.94% and the mode with the value of 2 appears more frequently than that of any other value.

- Q29) Respondents are aligned on the views that the organisation has a clear view of how much the current business is likely to be disrupted in the short-, medium- and long-term. The median-score for all respondent was calculated as 48.10% whilst the mode with the value of 5 appears more frequently than that of any other value. The aggregate median-score across all Banks is 47.44% whilst the mode with the value of 6 appears more frequently than that of any other value.
- Q30) Respondents are aligned on the views that the organisation is determined how much is needed to be invested in preparation for future disruptions to existing business activities. The median-score for all respondent was calculated as 50.48% whilst the mode with the value of 5 appears more frequently than that of any other value. The aggregate median-score across all Banks is 47.10% whilst the mode with the value of 5 appears more frequently than that of any other value.

Appendix - K.6 – Digital Maturity Survey Results for Customer Orientation and Engagement

- Bank A achieved a median value for all the questions relating to New Customer Orientation and Engagement, where respondents rated on the Likert scales, equated to 38.7%, the aggregate score across all Banks is 47.6%. This value is derived from the following scores.
  - Q31) Respondents are not aligned on the view that the organisation uses customer centricity to drive and inform initiatives. The median value for all respondents was calculated as 35.71% and the mode value of 2 that appears more frequently than that of any other value. The aggregate median-score across all Banks is 50.00% and the

mode value of 2 that appears more frequently than that of any other value.

- Q32.1) Respondents are not aligned on the view that the organisation uses technology and "Digital" methodologies to understand and engage with customers. The Bank achieved a weighting-score of 43.88% and the mode with the value of 5 appears more frequently than that of any other value. The aggregate median-score across all Banks is 50.66% and the mode with the value of 5 appears more frequently than that of any other value.
- Q32.2) Respondents are generally aligned on the views that the organisation regularly conducts customer research to remain in-tune with the needs and behaviours of customers. This resulted in a median-score of 41.50% and the mode with the value of 5 appears more frequently than that of any other value. The aggregate median-score across all Banks is 50.50% and the mode with the value of 4 appears more frequently than that of any other value.
- Q32.3) Respondents are generally aligned on the view that the organisation makes use of Digital channels, namely: online, social media and mobile, to market products and services. The median-score for all respondent was calculated as 53.74% whilst the mode with the value of 6 appears more frequently than that of any other value. The aggregate median-score across all Banks is 56.01% whilst the mode could not be determined.
- Q32.4) Respondents are generally aligned on the view that the organisation makes use of Digital channels to sell products and services. The median-score for all respondent was calculated as 58.16% whilst the mode with the value of 6 appears more frequently than that of any other value. The aggregate median-score across all

Banks is 59.07% whilst the mode with the value of 6 appears more frequently than that of any other value.

- Q32.5) Respondents are not aligned on the view that the organisation performs testing of promising ideas in a speedy manner, as proof of concept/minimum products. The median-score for all respondent was calculated as 29.25% whilst the mode with the value of 4 appears more frequently than that of any other value. The aggregate median-score across all Banks is 44.83% whilst the mode with the value of 5 appears more frequently than that of any other value.
- Q32.6) Respondents are aligned on the view that the organisation makes use of Digital technologies to integrate different channels. The median-score for all respondent was calculated as 42.54% whilst the mode with the value of 5 appears more frequently than that of any other value. The aggregate median-score across all Banks is 49.10% whilst the mode with the value of 5 appears more frequently than that of any other value.
- Q32.7) Respondents are generally aligned on the view that the organisation has not implemented AI to improve the customer experience. The median-score for all respondent was calculated as 26.87% whilst the mode with the value of 4 appears more frequently than that of any other value. The aggregate median-score across all Banks is 41.02% whilst the mode with the value of 5 appears more frequently than that of any other value.
- Q32.8) Respondents are generally aligned on the view that the organisation does not make use of IoT technologies to understand customer patterns of products and services. The median-score for all respondent was calculated as 27.21% whilst the mode with the value of 4 appears more frequently than that of any other value. The aggregate median-score across all Banks is 43.36% whilst the

mode with the value of 5 appears more frequently than that of any other value.

- Q32.9) Respondents are generally aligned on the view that the organisation does not make use of IoT technologies to provide pre-emptive customer service remotely or on-site. The median-score for all respondent was calculated as 28.57% whilst the mode with the value of 4 appears more frequently than that of any other value. The aggregate median-score across all Banks is 36.67% whilst the mode with the value of 4 appears more frequently than that of any other value.

- Bank B achieved a median value for all the questions relating to New Customer Orientation and Engagement, where respondents rated on the Likert scales, equated to 47.8%, the aggregate score across all Banks is 47.6%. This value is derived from the following scores.
  - Q31) Respondents are aligned on the view that the organisation uses customer centricity to drive and inform initiatives. The median value for all respondents was calculated as 33.33% and the mode value of 2 that appears more frequently than that of any other value. The aggregate median-score across all Banks is 50.00% and the mode value of 2 that appears more frequently than that of any other value.
  - Q32.1) Respondents are aligned on the view that the organisation uses technology and "Digital" methodologies to understand and engage with customers. The Bank achieved a weighting-score of 43.81% and the mode with the value of 5 appears more frequently than that of any other value. The aggregate median-score across all Banks is 50.66% and the mode with the value of 5 appears more frequently than that of any other value.
  - Q32.2) Respondents are aligned on the views that the organisation regularly conducts customer research to remain in-tune with the

needs and behaviours of customers. This resulted in a median-score of 52.38% and the mode with the value of 5 appears more frequently than that of any other value. The aggregate median-score across all Banks is 50.50% and the mode with the value of 4 appears more frequently than that of any other value.

- Q32.3) Respondents are generally aligned on the view that the organisation makes use of Digital channels, namely: online, social media and mobile, to market products and services. The median-score for all respondent was calculated as 52.38% whilst the mode with the value of 5 appears more frequently than that of any other value. The aggregate median-score across all Banks is 56.01% whilst the mode could not be determined.
- Q32.4) Respondents are aligned on the view that the organisation makes use of Digital channels to sell products and services. The median-score for all respondent was calculated as 57.14% whilst the mode with the value of 5 appears more frequently than that of any other value. The aggregate median-score across all Banks is 59.07% whilst the mode with the value of 6 appears more frequently than that of any other value.
- Q32.5) Respondents are aligned on the view that the organisation performs testing of promising ideas in a speedy manner, as proof of concept/minimum products. The median-score for all respondent was calculated as 47.14% whilst the mode with the value of 5 appears more frequently than that of any other value. The aggregate median-score across all Banks is 44.83% whilst the mode with the value of 5 appears more frequently than that of any other value.
- Q32.6) Respondents are aligned on the view that the organisation makes use of Digital technologies to integrate different channels. The median-score for all respondent was calculated as 48.57%

whilst the mode with the value of 5 appears more frequently than that of any other value. The aggregate median-score across all Banks is 49.10% whilst the mode with the value of 5 appears more frequently than that of any other value.

- Q32.7) Respondents are aligned on the view that the organisation has implemented AI to improve the customer experience. The median-score for all respondent was calculated as 47.62% whilst the mode with the value of 5 appears more frequently than that of any other value. The aggregate median-score across all Banks is 41.02% whilst the mode with the value of 5 appears more frequently than that of any other value.
- Q32.8) Respondents are generally aligned on the view that the organisation not make use of IoT technologies to understand customer patterns of products and services. The median-score for all respondent was calculated as 47.62% whilst the mode with the value of 5 appears more frequently than that of any other value. The aggregate median-score across all Banks is 43.36% whilst the mode with the value of 5 appears more frequently than that of any other value.
- Q32.9) Respondents are generally aligned on the view that the organisation does not make use of IoT technologies to provide pre-emptive customer service remotely or on-site. The median-score for all respondent was calculated as 30.48% whilst the mode could not be determined. The aggregate median-score across all Banks is 36.67% whilst the mode with the value of 4 appears more frequently than that of any other value.

- Bank C achieved a median value for all the questions relating to New Customer Orientation and Engagement, where respondents rated on the Likert scales, equated to 60.0%, the aggregate score across all Banks is 47.6%. This value is derived from the following scores.

- Q31) Respondents are aligned on the view that the organisation uses customer centricity to drive and inform initiatives. The median value for all respondents was calculated as 80.95% and the mode value of 3 that appears more frequently than that of any other value. The aggregate median-score across all Banks is 50.00% and the mode value of 2 that appears more frequently than that of any other value.
- Q32.1) Respondents are very aligned on the view that the organisation uses technology and "Digital" methodologies to understand and engage with customers. The Bank achieved a weighting-score of 64.29% and the mode with the value of 6 appears more frequently than that of any other value. The aggregate median-score across all Banks is 50.66% and the mode with the value of 5 appears more frequently than that of any other value.
- Q32.2) Respondents are aligned on the views that the organisation regularly conducts customer research to remain in-tune with the needs and behaviours of customers. This resulted in a median-score of 57.62% and the mode with the value of 6 appears more frequently than that of any other value. The aggregate median-score across all Banks is 50.50% and the mode with the value of 4 appears more frequently than that of any other value.
- Q32.3) Respondents are aligned on the view that the organisation makes use of Digital channels, namely: online, social media and mobile, to market products and services. The median-score for all respondent was calculated as 61.90% whilst the mode with the value of 6 appears more frequently than that of any other value. The aggregate median-score across all Banks is 56.01% whilst the mode could not be determined.

- Q32.4) Respondents are aligned on the view that the organisation makes use of Digital channels to sell products and services. The median-score for all respondent was calculated as 61.90% whilst the mode with the value of 6 appears more frequently than that of any other value. The aggregate median-score across all Banks is 59.07% whilst the mode with the value of 6 appears more frequently than that of any other value.
- Q32.5) Respondents are generally aligned on the view that the organisation performs testing of promising ideas in a speedy manner, as proof of concept/minimum products. The median-score for all respondent was calculated as 57.62% whilst the mode with the value of 6 appears more frequently than that of any other value. The aggregate median-score across all Banks is 44.83% whilst the mode with the value of 5 appears more frequently than that of any other value.
- Q32.6) Respondents are very aligned on the view that the organisation makes use of Digital technologies to integrate different channels. The median-score for all respondent was calculated as 56.19% whilst the mode with the value of 6 appears more frequently than that of any other value. The aggregate median-score across all Banks is 49.10% whilst the mode with the value of 5 appears more frequently than that of any other value.
- Q32.7) Respondents are aligned on the view that the organisation has implemented AI to improve the customer experience. The median-score for all respondent was calculated as 48.57% whilst the mode with the value of 5 appears more frequently than that of any other value. The aggregate median-score across all Banks is 41.02% whilst the mode with the value of 5 appears more frequently than that of any other value.

- Q32.8) Respondents are generally aligned on the view that the organisation not make use of IoT technologies to understand customer patterns of products and services. The median-score for all respondent was calculated as 55.25% whilst the mode with the value of 5 appears more frequently than that of any other value. The aggregate median-score across all Banks is 43.36% whilst the mode with the value of 5 appears more frequently than that of any other value.
- Q32.9) Respondents are generally aligned on the view that the organisation does not make use of IoT technologies to provide pre-emptive customer service remotely or on-site. The median-score for all respondent was calculated as 50.95% whilst the mode with the value of 5 appears more frequently than that of any other value. The aggregate median-score across all Banks is 36.67% whilst the mode with the value of 4 appears more frequently than that of any other value.

Appendix - K.7 – Digital Maturity Survey Results for Workforce Enablement and Skills

- Bank A achieved a median value for all the questions relating to Workforce Enablement and Skills, where respondents rated on the Likert scales, equated to 42.0%, the aggregate score across all Banks is 46.8%. This value is derived from the following scores.
  - Q33) Respondents are not aligned towards the view that organisation actively drives employee engagement and inclusion in the workplace. The median value for all respondents was calculated as 33.33% and the mode value of 2 that appears more frequently than that of any other value. The aggregate median-score across all

Banks is 28.89% and the mode value of 2 that appears more frequently than that of any other value.

- Q34) Respondents are not aligned on the view that the organisation actively engages staff as a community. The Bank achieved a weighting-score of 54.76% and the mode with the value of 4 appears more frequently than that of any other value. The aggregate median-score across all Banks is 72.70% and the mode with the value of 4 appears more frequently than that of any other value.
- Q35.1) Respondents are not aligned on the view that employees take ownership in the operational implementation of new innovative ideas. This resulted in a median-score of 32.65% and the mode with the value of 4 appears more frequently than that of any other value. The aggregate median-score across all Banks is 48.19% and the mode with the value of 5 appears more frequently than that of any other value.
- Q35.2) Respondents are aligned on the view that employees have to deal with bureaucracy to submit new ideas. The median-score for all respondent was calculated as 25.17% whilst the mode with the value of 3 appears more frequently than that of any other value. The aggregate median-score across all Banks is 43.63% whilst the mode with the value of 5 appears more frequently than that of any other value.
- Q35.3) Respondents are not aligned on the views that the organisation provides Digital talent the required tools to collaborate. The median-score for all respondent was calculated as 45.92% whilst the mode with the value of 5 appears more frequently than that of any other value. The aggregate median-score across all Banks is 50.70% whilst the mode with the value of 5 appears more frequently than that of any other value.

- Q36) Respondents are aligned on the views that the organisation has moderate Digital skills located in some strategic areas or initiatives. The median-score for all respondent was calculated as 41.03% whilst the mode with the value of 2 appears more frequently than that of any other value. The aggregate median-score across all Banks is 47.01% whilst the mode with the value of 2 appears more frequently than that of any other value.
- Q37.1) Respondents are not aligned on the views that the organisation uses Human Resource management analytics to understand employee preferences towards aspects such as career development and training. The median-score for all respondent was calculated as 33.33% whilst the mode with the value of 5 appears more frequently than that of any other value. The aggregate median-score across all Banks is 43.02% whilst the mode with the value of 5 appears more frequently than that of any other value.
- Q37.2) Respondents are not aligned on the views that the organisation uses Human Resource management analytics to identify the skills needed both today and into the future. The median-score for all respondent was calculated as 34.69% whilst the mode could not be determined. The aggregate median-score across all Banks is 36.64% whilst the mode with the value of 4 appears more frequently than that of any other value.
- Q37.3) Respondents are generally aligned on the view that upskilling and / or re-skilling on Digital skills is a top priority for the organisation. The median-score for all respondent was calculated as 52.04% whilst the mode with the value of 5 appears more frequently than that of any other value. The aggregate median-score across all Banks is 53.22% whilst the mode with the value of 5 appears more frequently than that of any other value.

- Q37.4) Respondents are generally aligned on the view that leadership actively promotes Digital kills learning and development for employees. The median-score for all respondent was calculated as 52.04% whilst the mode with the value of 5 appears more frequently than that of any other value. The aggregate median-score across all Banks is 51.79% whilst the mode with the value of 5 appears more frequently than that of any other value.
- Q37.5) Respondents are generally aligned on the view that the organisation actively recruits and hires new talent with strong Digital skills. The median-score for all respondent was calculated as 44.22% whilst the mode with the value of 4 appears more frequently than that of any other value. The aggregate median-score across all Banks is 49.02% whilst the mode with the value of 5 appears more frequently than that of any other value.
- Q37.6) Respondents are not aligned on the view that the organisation has a formal program for Digital reskilling employees, inclusive of training and mentoring. The median-score for all respondent was calculated as 44.22% whilst the mode with the value of 5 appears more frequently than that of any other value. The aggregate median-score across all Banks is 47.44% whilst the mode with the value of 5 appears more frequently than that of any other value.
- Q38.1) Respondents are not aligned on the view that the organisation is aware of the new skills which need to be developed in the next 3 to 5 years. The median-score for all respondent was calculated as 47.62% whilst the mode could not be determined. The aggregate median-score across all Banks is 48.25% whilst the mode with the value of 5 appears more frequently than that of any other value.

- Q38.2) Respondents are aligned on the view that the organisation provides the necessary learning infrastructure for upskilling of employees. The median-score for all respondent was calculated as 47.96% whilst the mode with the value of 5 appears more frequently than that of any other value. The aggregate median-score across all Banks is 45.67% whilst the mode with the value of 5 appears more frequently than that of any other value.
- Q38.3) Respondents are not aligned on the view that the organisation creates an environment that prioritizes and rewards learning and establishes a supportive and cooperative atmosphere. The median-score for all respondent was calculated as 40.82% whilst the mode with the value of 5 appears more frequently than that of any other value. The aggregate median-score across all Banks is 48.84% whilst the mode with the value of 5 appears more frequently than that of any other value.

- Bank B achieved a median value for all the questions relating to Workforce Enablement and Skills, where respondents rated on the Likert scales, equated to 48.1%, the aggregate score across all Banks is 46.8%. This value is derived from the following scores.
  - Q33) Respondents are not aligned towards the view that organisation actively drives employee engagement and inclusion in the workplace. The median value for all respondents was calculated as 23.33% and the mode could not be determined. The aggregate median-score across all Banks is 28.89% and the mode value of 2 that appears more frequently than that of any other value.
  - Q34) Respondents are generally aligned on the views that the organisation actively engages staff as a decentralized-community, with one-to-many communication as well as driving peer-to-peer value creation. The Bank achieved a weighting-score of 90.00% and the mode with the value of 4 appears more frequently than that of

any other value. The aggregate median-score across all Banks is 72.70% and the mode with the value of 4 appears more frequently than that of any other value.

- Q35.1) Respondents are generally aligned on the views that employees take ownership in the operational implementation of new innovative ideas. This resulted in a median-score of 52.38% and the mode with the value of 5 appears more frequently than that of any other value. The aggregate median-score across all Banks is 48.19% and the mode with the value of 5 appears more frequently than that of any other value.
- Q35.2) Respondents are aligned on the views that employees do not have to deal with bureaucracy to submit new ideas. The median-score for all respondent was calculated as 57.14% whilst the mode with the value of 5 appears more frequently than that of any other value. The aggregate median-score across all Banks is 43.63% whilst the mode with the value of 5 appears more frequently than that of any other value.
- Q35.3) Respondents are aligned on the views that the organisation provides Digital talent the required tools to collaborate. The median-score for all respondent was calculated as 52.38% whilst the mode with the value of 5 appears more frequently than that of any other value. The aggregate median-score across all Banks is 50.70% whilst the mode with the value of 5 appears more frequently than that of any other value.
- Q36) Respondents are aligned on the views that the organisation has moderate Digital skills located in some strategic areas or initiatives. The median-score for all respondent was calculated as 33.33% whilst the mode with the value of 2 appears more frequently than that of any other value. The aggregate median-score across all

Banks is 47.01% whilst the mode with the value of 2 appears more frequently than that of any other value.

- Q37.1) Respondents are very aligned on the views that the organisation uses Human Resource management analytics to understand employee preferences towards aspects such as career development and training. The median-score for all respondent was calculated as 47.62% whilst the mode with the value of 5 appears more frequently than that of any other value. The aggregate median-score across all Banks is 43.02% whilst the mode with the value of 5 appears more frequently than that of any other value.
- Q37.2) Respondents are not aligned on the views that the organisation uses Human Resource management analytics to identify the skills needed both today and into the future. The median-score for all respondent was calculated as 32.38% whilst the mode with the value of 4 appears more frequently than that of any other value. The aggregate median-score across all Banks is 36.64% whilst the mode with the value of 4 appears more frequently than that of any other value.
- Q37.3) Respondents are aligned on the view that upskilling and / or re-skilling on Digital skills is a top priority for the organisation. The median-score for all respondent was calculated as 52.38% whilst the mode with the value of 5 appears more frequently than that of any other value. The aggregate median-score across all Banks is 53.22% whilst the mode with the value of 5 appears more frequently than that of any other value.
- Q37.4) Respondents are generally aligned on the view that leadership actively promotes Digital kills learning and development for employees. The median-score for all respondent was calculated as 48.57% whilst the mode with the value of 5 appears more frequently than that of any other value. The aggregate median-score

across all Banks is 51.79% whilst the mode with the value of 5 appears more frequently than that of any other value.

- Q37.5) Respondents are generally aligned on the view that the organisation actively recruits and hires new talent with strong Digital skills. The median-score for all respondent was calculated as 47.62% whilst the mode with the value of 5 appears more frequently than that of any other value. The aggregate median-score across all Banks is 49.02% whilst the mode with the value of 5 appears more frequently than that of any other value.
- Q37.6) Respondents are aligned on the view that the organisation has a formal program for Digital reskilling employees, inclusive of training and mentoring. The median-score for all respondent was calculated as 52.38% whilst the mode with the value of 5 appears more frequently than that of any other value. The aggregate median-score across all Banks is 47.44% whilst the mode with the value of 5 appears more frequently than that of any other value.
- Q38.1) Respondents are marginally aligned on the view that the organisation is aware of the new skills which need to be developed in the next 3 to 5 years. The median-score for all respondent was calculated as 40.00% whilst the mode with the value of 5 appears more frequently than that of any other value. The aggregate median-score across all Banks is 48.25% whilst the mode with the value of 5 appears more frequently than that of any other value.
- Q38.2) Respondents are marginally aligned on the view that the organisation provides the necessary learning infrastructure for upskilling of employees. The median-score for all respondent was calculated as 40.00% whilst the mode with the value of 5 appears more frequently than that of any other value. The aggregate median-score across all Banks is 45.67% whilst the mode with the value of 5 appears more frequently than that of any other value.

- Q38.3) Respondents are aligned on the view that the organisation creates an environment that prioritizes and rewards learning and establishes a supportive and cooperative atmosphere. The median-score for all respondent was calculated as 52.38% whilst the mode with the value of 5 appears more frequently than that of any other value. The aggregate median-score across all Banks is 48.84% whilst the mode with the value of 5 appears more frequently than that of any other value.

- Bank C achieved a median value for all the questions relating to Workforce Enablement and Skills, where respondents rated on the Likert scales, equated to 52.9%, the aggregate score across all Banks is 46.8%. This value is derived from the following scores.
  - Q33) Respondents are divided on the view that organisation actively drives employee engagement and inclusion in the workplace. The median value for all respondents was calculated as 30.00% and the mode could not be determined. The aggregate median-score across all Banks is 28.89% and the mode value of 2 that appears more frequently than that of any other value.
  - Q34) Respondents are not aligned on the view that the organisation actively engages staff as a decentralized-community, with one-to-many communication as well as driving peer-to-peer value creation. The Bank achieved a weighting-score of 73.33% and the mode with the value of 4 appears more frequently than that of any other value. The aggregate median-score across all Banks is 72.70% and the mode with the value of 4 appears more frequently than that of any other value.
  - Q35.1) Respondents are very aligned on the views that employees take ownership in the operational implementation of new innovative ideas. This resulted in a median-score of 59.52% and the mode could not be determined. The aggregate median-score across all

Banks is 48.19% and the mode with the value of 5 appears more frequently than that of any other value.

- Q35.2) Respondents are aligned on the views that employees do have to deal with bureaucracy to submit new ideas. The median-score for all respondent was calculated as 48.57% whilst the mode with the value of 5 appears more frequently than that of any other value. The aggregate median-score across all Banks is 43.63% whilst the mode with the value of 5 appears more frequently than that of any other value.
- Q35.3) Respondents are aligned on the views that the organisation provides Digital talent the required tools to collaborate. The median-score for all respondent was calculated as 53.81% whilst the mode with the value of 5 appears more frequently than that of any other value. The aggregate median-score across all Banks is 50.70% whilst the mode with the value of 5 appears more frequently than that of any other value.
- Q36) Respondents are marginally aligned on the views that the organisation has moderate and / or strong Digital skills located in some strategic areas or initiatives. The median-score for all respondent was calculated as 66.67% whilst the mode could not be determined. The aggregate median-score across all Banks is 47.01% whilst the mode with the value of 2 appears more frequently than that of any other value.
- Q37.1) Respondents are reasonably aligned on the views that the organisation uses Human Resource management analytics to understand employee preferences towards aspects such as career development and training. The median-score for all respondent was calculated as 48.10% whilst the mode with the value of 5 appears more frequently than that of any other value. The aggregate

median-score across all Banks is 43.02% whilst the mode with the value of 5 appears more frequently than that of any other value.

- Q37.2) Respondents are not aligned on the views that the organisation uses Human Resource management analytics to identify the skills needed both today and into the future. The median-score for all respondent was calculated as 42.86% whilst the mode could not be determined. The aggregate median-score across all Banks is 36.64% whilst the mode with the value of 4 appears more frequently than that of any other value.
- Q37.3) Respondents are aligned on the view that upskilling and / or re-skilling on Digital skills is a top priority for the organisation. The median-score for all respondent was calculated as 55.24% whilst the mode with the value of 5 appears more frequently than that of any other value. The aggregate median-score across all Banks is 53.22% whilst the mode with the value of 5 appears more frequently than that of any other value.
- Q37.4) Respondents are very aligned on the view that leadership actively promotes Digital kills learning and development for employees. The median-score for all respondent was calculated as 54.76% whilst the mode with the value of 5 appears more frequently than that of any other value. The aggregate median-score across all Banks is 51.79% whilst the mode with the value of 5 appears more frequently than that of any other value.
- Q37.5) Respondents are aligned on the view that the organisation actively recruits and hires new talent with strong Digital skills. The median-score for all respondent was calculated as 55.24% whilst the mode with the value of 5 appears more frequently than that of any other value. The aggregate median-score across all Banks is 49.02% whilst the mode with the value of 5 appears more frequently than that of any other value.

- Q37.6) Respondents are marginally aligned on the view that the organisation has a formal program for Digital reskilling employees, inclusive of training and mentoring. The median-score for all respondent was calculated as 45.71% whilst the mode could not be determined. The aggregate median-score across all Banks is 47.44% whilst the mode with the value of 5 appears more frequently than that of any other value.
- Q38.1) Respondents are aligned on the view that the organisation is aware of the new skills which need to be developed in the next 3 to 5 years. The median-score for all respondent was calculated as 57.14% whilst the mode with the value of 5 appears more frequently than that of any other value. The aggregate median-score across all Banks is 48.25% whilst the mode with the value of 5 appears more frequently than that of any other value.
- Q38.2) Respondents are aligned on the view that the organisation provides the necessary learning infrastructure for upskilling of employees. The median-score for all respondent was calculated as 49.05% whilst the mode with the value of 5 appears more frequently than that of any other value. The aggregate median-score across all Banks is 45.67% whilst the mode with the value of 5 appears more frequently than that of any other value.
- Q38.3) Respondents are aligned on the view that the organisation creates an environment that prioritizes and rewards learning and establishes a supportive and cooperative atmosphere. The median-score for all respondent was calculated as 53.33% whilst the mode could not be determined. The aggregate median-score across all Banks is 48.84% whilst the mode with the value of 5 appears more frequently than that of any other value.

Appendix - K.8 – Digital Maturity Survey Results for Operations and Core Business Processes

- Bank A achieved a median value for all the questions relating to Operations and Core Business Processes, where respondents rated on the Likert scales, equated to 28.3%, the aggregate score across all Banks is 33.8%. This value is derived from the following scores.
    - Q39) Respondents support the view that the organisation does not use some variant of objective and key results (OKRs) to track individual and / or team performance as well as OKRs are scarcely used in innovation areas or at the edges of the organisation. The median value for all respondents was calculated as 8.97% and the mode value of 1 that appears more frequently than that of any other value. The aggregate median-score across all Banks is 14.66% and the mode with the value of 1 appears more frequently than that of any other value.
    - Q40) Respondents believe that the organisation does not constantly optimize processes through experimentation, A/B testing and short feedback loops. The Bank achieved a weighting-score of 10.71% with a mode value of 1 that appears more frequently than that of any other value. The aggregate median-score across all Banks is 31.97% and the mode with the value of 1 appears more frequently than that of any other value.
    - Q41) Respondents support the view that the organisation collects and analyses data mostly via reporting systems, without the use of algorithms and machine learning. This resulted in a median-score of 15.48%, with a mode value of 2 that appears more frequently than that of any other value. The aggregate median-score across all Banks is 30.71% and the mode with the value of 2 appears more frequently than that of any other value.

- Q42.1) Respondents are divided on the view that Digital technologies allow the organisation to link customer-facing and operational processes in new ways. The median-score for all respondent was calculated as 41.50% whilst the mode with the value of 5 appears more frequently than that of any other value. The aggregate median-score across all Banks is 51.61% whilst the mode with the value of 5 appears more frequently than that of any other value.
- Q42.2) Respondents perceive that the organisation does not constantly identify innovation in its value chain, through the use of Digital technologies. The median-score for all respondent was calculated as 40.14% whilst the mode with the value of 5 appears more frequently than that of any other value. The aggregate median-score across all Banks is 45.12% whilst the mode with the value of 5 appears more frequently than that of any other value.
- Q42.3) Respondents are not aligned on the views that the organisation has an integrated view of customer and operations. This resulted in a median-score of 33.33% and the mode with the value of 4 appears more frequently than that of any other value. The aggregate median-score across all Banks is 45.56% and the mode with the value of 5 appears more frequently than that of any other value.
- Q42.4) Respondents agree that the organisation uses Digital technologies to increase the performance or customer value of existing products and services. The median-score for all respondent was calculated as 42.18% and the mode with the value of 5 appears more frequently than that of any other value. The aggregate median-score across all Banks is 48.34% and the mode with the value of 5 appeared more frequently than that of any other value.

- Q42.5) Respondents do not support the view that AI has been implemented into operations. This resulted in a median-score of 34.69% and the mode with the value of 4 appears more frequently than that of any other value. The aggregate median-score across all Banks is 32.68% and the mode could not be determined.
- Q42.6) Respondents do not support the view that IoT has been implemented into operations. The median-score for all respondent was calculated as 31.97% and the mode with the value of 4 appeared more frequently than that of any other value. The aggregate median-score across all Banks is 36.21% and the mode with the value of 4 appeared more frequently than that of any other value.

- Bank B achieved a median value for all the questions relating to Operations and Core Business Processes, where respondents rated on the Likert scales, equated to 37.8%, the aggregate score across all Banks is 33.8%. This value is derived from the following scores.
  - Q39) Respondents support the view that the organisation does not use some variant of objective and key results (OKRs) to track individual and / or team performance as well as OKRs are sparsely used in innovation areas or at the edges of the organisation. The median value for all respondents was calculated as 6.67% and the mode value of 1 that appears more frequently than that of any other value. The aggregate median-score across all Banks is 14.66% and the mode with the value of 1 appears more frequently than that of any other value.
  - Q40) Respondents are aligned on the view that the organisation uses the Lean approach for product innovation and product development. The Bank achieved a weighting-score of 50.00% with a mode value of 3 that appears more frequently than that of any other value. The aggregate median-score across all Banks is

31.97% and the mode with the value of 1 appears more frequently than that of any other value.

- Q41) Respondents are divided on the view that algorithms and machine learning are used by the organisation to make meaningful decisions. This resulted in a median-score of 30.00%, with a mode value of 2 that appears more frequently than that of any other value. The aggregate median-score across all Banks is 30.71% and the mode with the value of 2 appears more frequently than that of any other value.
- Q42.1) Respondents are divided on the view that Digital technologies allow the organisation to link customer-facing and operational processes in new ways. The median-score for all respondent was calculated as 41.50% whilst the mode with the value of 5 appears more frequently than that of any other value. The aggregate median-score across all Banks is 51.61% whilst the mode with the value of 5 appears more frequently than that of any other value.
- Q42.2) Respondents perceive that the organisation constantly identifies innovation in its value chain, through the use of Digital technologies. The median-score for all respondent was calculated as 48.57% whilst the mode with the value of 5 appears more frequently than that of any other value. The aggregate median-score across all Banks is 45.12% whilst the mode with the value of 5 appears more frequently than that of any other value.
- Q42.3) Respondents are aligned on the views that the organisation has an integrated view of customer and operations. This resulted in a median-score of 61.90% and the mode with the value of 6 appears more frequently than that of any other value. The aggregate median-score across all Banks is 45.56% and the mode with the value of 5 appears more frequently than that of any other value.

- Q42.4) Respondents generally agree that the organisation uses Digital technologies to increase the performance or customer value of existing products and services. The median-score for all respondent was calculated as 57.14% and the mode with the value of 5 appears more frequently than that of any other value. The aggregate median-score across all Banks is 48.34% and the mode with the value of 5 appeared more frequently than that of any other value.
- Q42.5) Respondents are divided on the view that AI has been implemented into operations. This resulted in a median-score of 27.62% and the mode with the value of 3 appears more frequently than that of any other value. The aggregate median-score across all Banks is 32.68% and the mode could not be determined.
- Q42.6) Respondents are divided on the view that IoT has been implemented into operations. The median-score for all respondent was calculated as 36.19% and the mode with the value of 4 appeared more frequently than that of any other value. The aggregate median-score across all Banks is 36.21% and the mode with the value of 4 appeared more frequently than that of any other value.

- Bank C achieved a median value for all the questions relating to Operations and Core Business Processes, where respondents rated on the Likert scales, equated to 39.6%, the aggregate score across all Banks is 33.8%. This value is derived from the following scores.
  - Q39) Respondents are divided on the view that the organisation uses some variant of objective and key results (OKRs) to track individual and / or team performance. The median value for all respondents was calculated as 28.33% and the mode value of 1 that appears more frequently than that of any other value. The

aggregate median-score across all Banks is 14.66% and mode with the value of 1 appears more frequently than of any other value.

- Q40) Respondents are divided on the view that the organisation constantly optimizes processes through experimentation, A/B testing and short feedback loops. The Bank achieved a weighting-score of 35.19% with a mode value of 1 that appears more frequently than of any other value. The aggregate median-score across all Banks is 31.97% and the mode with the value of 1 appears more frequently than that of any other value.
- Q41) Respondents are divided on the view that algorithms and machine learning are used by the organisation to make meaningful decisions. This resulted in a median-score of 46.67% and the mode value could not be determined. The aggregate median-score across all Banks is 30.71% and the mode with the value of 2 appears more frequently than that of any other value.
- Q42.1) Respondents are aligned on the view that Digital technologies allow the organisation to link customer-facing and operational processes in new ways. The median-score for all respondent was calculated as 56.19% whilst the mode with the value of 6 appears more frequently than that of any other value. The aggregate median-score across all Banks is 51.61% whilst the mode with the value of 5 appears more frequently than that of any other value.
- Q42.2) Respondents perceive that the organisation constantly identifies innovation in its value chain, through the use of Digital technologies. The median-score for all respondent was calculated as 46.67% whilst the mode with the value of 5 appears more frequently than that of any other value. The aggregate median-score across all Banks is 45.12% whilst the mode with the value of 5 appears more frequently than that of any other value.

- Q42.3) Respondents are aligned on the views that the organisation has an integrated view of customer and operations. This resulted in a median-score of 41.43% and the mode with the value of 5 appears more frequently than that of any other value. The aggregate median-score across all Banks is 45.56% and the mode with the value of 5 appears more frequently than that of any other value.
- Q42.4) Respondents generally agree that the organisation uses Digital technologies to increase the performance or customer value of existing products and services. The median-score for all respondent was calculated as 45.71% and the mode with the value of 5 appears more frequently than that of any other value. The aggregate median-score across all Banks is 48.34% and mode with the value of 5 appeared more frequently than that of any other value.
- Q42.5) Respondents are divided on the view that AI has been implemented into operations. This resulted in a median-score of 35.71% and the mode with the value of 5 appears more frequently than that of any other value. The aggregate median-score across all Banks is 32.68% and the mode could not be determined.
- Q42.6) Respondents are divided on the view that IoT has been implemented into operations. The median-score for all respondent was calculated as 40.48% and mode with the value of 5 appeared more frequently than that of any other value. The aggregate median-score across all Banks is 36.21% and mode with the value of 4 appeared more frequently than that of any other value.

Appendix - K.9 – Digital Maturity Survey Results for Technology and Data Embeddedness

- Bank A achieved a median value for all the questions relating to Technology and Data Embeddedness, where respondents rated on the Likert scales, equated to 32.4%, the aggregate score across all Banks is 38.5%. This value is derived from the following scores.
    - Q43) Respondents are divided on the extent to which products and services are information based. The median value for all respondents was calculated as 53.57% and the mode value of 3 that appears more frequently than that of any other value. The aggregate median-score across all Banks is 51.75% and mode with the value of 3 appears more frequently than of any other value.
    - Q44) Respondents are divided on the extent to which social functionality and collaboration operate as a central element of the organisation's product and / or service offering. The Bank achieved a weighting-score of 17.95% and the mode could not be determined. The aggregate median-score across all Banks is 29.32% and the mode with the value of 2 appears more frequently than that of any other value.
    - Q45) Respondents are divided on the view that strategic data assets are shared internally across the organisation and / or exposed externally. This resulted in a median-score of 35.71% and the mode value could not be determined. The aggregate median-score across all Banks is 31.90% and the mode with the value of 2 appears more frequently than that of any other value.
    - Q46) Respondents are not aligned on the view on the extent to which social, mobile, analytics and cloud technologies are used across the organisation. The median-score for all respondent was calculated as 21.43% whilst the mode could not be determined. The aggregate median-score across all Banks is 32.70% whilst the

mode with the value of 1 appears more frequently than that of any other value.

- Q47) Respondents are divided on the view that the organisation has a mastery on the 6 key capabilities of Digital services mastery. The median-score for all respondent was calculated as 26.19% whilst the mode with the value of 2 appears more frequently than that of any other value. The aggregate median-score across all Banks is 46.51% whilst the mode with the value of 2 appears more frequently than that of any other value.
- Q48) Respondents are not aligned on the views that advanced social tools for knowledge-sharing, communication, coordination and / or collaboration are used in the organisation. This resulted in a median-score of 39.29% and the mode with the value of 2 appears more frequently than that of any other value. The aggregate median-score across all Banks is 47.54% and the mode with the value of 3 appears more frequently than that of any other value.
- Q49) Respondents generally agree that the organisation has realized incremental benefits through the use of Digital Transformation. The median-score for all respondent was calculated as 44.20% and the mode with the value of 2 appears more frequently than that of any other value. The aggregate median-score across all Banks is 43.90% and mode with the value of 2 appeared more frequently than that of any other value.

- Bank B achieved a median value for all the questions relating to Technology and Data Embeddedness, where respondents rated on the Likert scales, equated to 42.2%, the aggregate score across all Banks is 38.5%. This value is derived from the following scores.
  - Q43) Respondents are aligned on the extent to which products and services are information based. The median value for all respondents was calculated as 50.00% and the mode value of 3

that appears more frequently than that of any other value. The aggregate median-score across all Banks is 51.75% and mode with the value of 3 appears more frequently than of any other value.

- Q44) Respondents are divided on the extent to which social functionality and collaboration operate as a central element of the organisation's product and / or service offering. The Bank achieved a weighting-score of 30.00% and the mode could not be determined. The aggregate median-score across all Banks is 29.32% and the mode with the value of 2 appears more frequently than that of any other value.
- Q45) Respondents are divided on the view that strategic data assets are shared internally across the organisation and / or exposed externally. This resulted in a median-score of 23.33% and the mode with the value of 2 appears more frequently than that of any other value. The aggregate median-score across all Banks is 31.90% and the mode with the value of 2 appears more frequently than that of any other value.
- Q46) Respondents are not aligned on the view on the extent to which social, mobile, analytics and cloud technologies are used across the organisation. The median-score for all respondent was calculated as 40.00% whilst the mode with the value of 1 appears more frequently than that of any other value. The aggregate median-score across all Banks is 32.70% whilst the mode with the value of 1 appears more frequently than that of any other value.
- Q47) Respondents are divided on the view that the organisation has a mastery on the 6 key capabilities of Digital services mastery. The median-score for all respondent was calculated as 60.00% and whilst the mode with the value of 2 appears more frequently than that of any other value. The aggregate median-score across all

Banks is 46.51% whilst the mode with the value of 2 appears more frequently than that of any other value.

- Q48) Respondents are aligned on the views that most business units in the organisation make use of advanced social tools for knowledge-sharing, communication, coordination and / or collaboration. This resulted in a median-score of 50.00% and the mode with the value of 3 appears more frequently than that of any other value. The aggregate median-score across all Banks is 47.54% and the mode with the value of 3 appears more frequently than that of any other value.
- Q49) Respondents agree that the organisation has realized incremental benefits through the use of Digital Transformation. The median-score for all respondent was calculated as 37.50% and the mode with the value of 2 appears more frequently than that of any other value. The aggregate median-score across all Banks is 43.90% and mode with the value of 2 appeared more frequently than that of any other value.

- Bank C achieved a median value for all the questions relating to Technology and Data Embeddedness, where respondents rated on the Likert scales, equated to 44.3%, the aggregate score across all Banks is 38.5%. This value is derived from the following scores.
  - Q43) Respondents are not aligned on the extent to which products and services are information based. The median value for all respondents was calculated as 51.67% and the mode value of 3 that appears more frequently than that of any other value. The aggregate median-score across all Banks is 51.75% and mode with the value of 3 appears more frequently than of any other value.
  - Q44) Respondents are divided on the extent to which social functionality and collaboration operate as a central element of the organisation's product and / or service offering. The Bank achieved

a weighting-score of 40.00% and the mode with the value of 2 appears more frequently than that of any other value. The aggregate median-score across all Banks is 29.32% and the mode with the value of 2 appears more frequently than that of any other value.

- Q45) Respondents are divided on the view that strategic data assets are shared internally across the organisation and / or exposed externally. This resulted in a median-score of 36.67% and the mode with the value of 3 appears more frequently than that of any other value. The aggregate median-score across all Banks is 31.90% and the mode with the value of 2 appears more frequently than that of any other value.
- Q46) Respondents are not aligned on the view on the extent to which social, mobile, analytics and cloud technologies are used across the organisation. The median-score for all respondent was calculated as 46.67% whilst the mode with the value of 2 appears more frequently than that of any other value. The aggregate median-score across all Banks is 32.70% whilst the mode with the value of 1 appears more frequently than that of any other value.
- Q47) Respondents are divided on the view that the organisation has a mastery on the 6 key capabilities of Digital services mastery. The median-score for all respondent was calculated as 53.33% and whilst and the mode could not be determined. The aggregate median-score across all Banks is 46.51% whilst the mode with the value of 2 appears more frequently than that of any other value.
- Q48) Respondents are not aligned on the views that most business units in the organisation make use of advanced social tools for knowledge-sharing, communication, coordination and / or collaboration. This resulted in a median-score of 53.33% and the mode with the value of 3 appears more frequently than that of any

other value. The aggregate median-score across all Banks is 47.54% and the mode with the value of 3 appears more frequently than that of any other value.

- Q49) Respondents generally agree on the view that the organisation has realized incremental and or transformational benefits through the use of Digital Transformation. The median-score for all respondent was calculated as 50.00% and the mode with the value of 2 appears more frequently than that of any other value. The aggregate median-score across all Banks is 43.90% and mode with the value of 2 appeared more frequently than that of any other value.

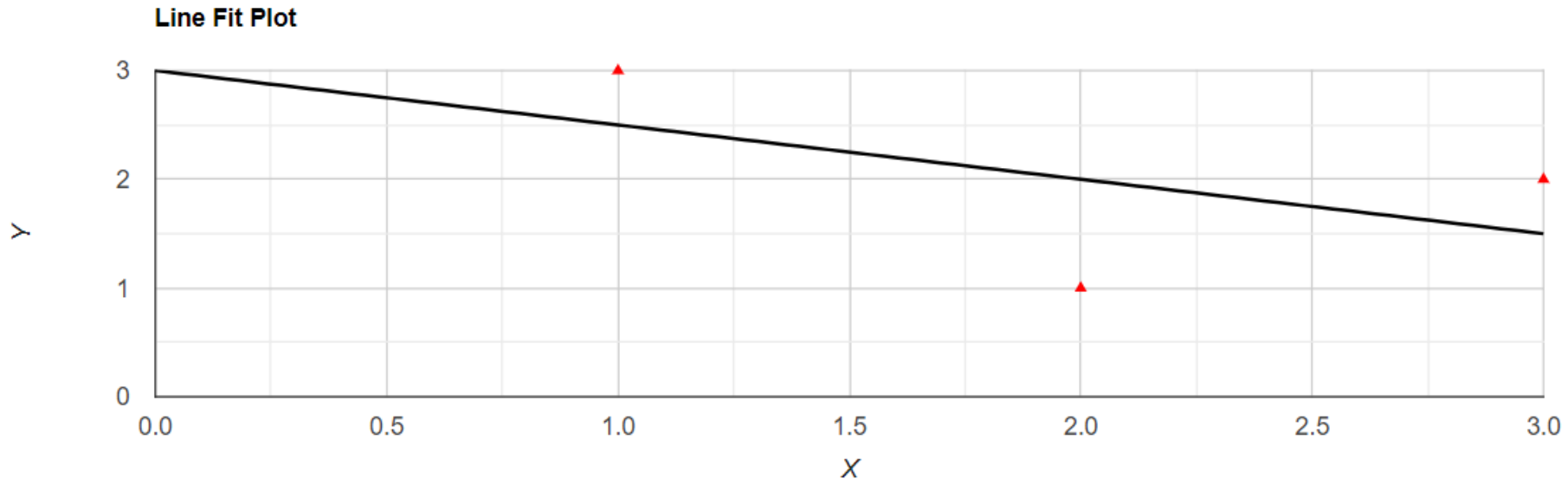
Appendix - L – Observations used for statistical analysis, Confidence Interval Testing and sampling of Business Performance indicators for financial periods 2018/2019

Financial ratios for period 2018/2019vwith Digital Maturity scores included				
		Bank A	**Bank B**	**Bank C**
1	Revenue/Employee ratio (RER)	2078420.67 (normalized to 34.657% of total)	1929212.79 (normalized to 32.169% of total)	1989449.31(normalized to 33.174% of total)
2	Fixed Asset Turnover ratio (FATR).	23.286%	18.915%	7.722%
3	EBIT Margin (income/revenue) (EBITM).	30.153	42.473	16.492
4	Net Profit Margin (net profit / revenue) (NPM)	22.262	31.283	14.921
5	Return on Equity 2018/2019 (RoE)	15.83%	11.1%	21.21%
6	Return on Assets 2018/2019 (RoA)	1.20%	0.50%	1.74%
7	Credit Loss Ratio 2018/2019 (CLR)	0.73%	6.9%	0.88%
8	Cost-to-Income Ratio 2018/2019 (CTIR)	57.70%	45.00%	51.80%
9	Capital Adequacy Ratio 2018/2019 (CAR)	16.50%	38.5%	15.2%
10	Digital Enablement and Adoption	28.27%	34.23%	38.43%
11	Leadership and Strategy	44.44%	56.04%	69.98%

Source: Financial Ratios taken from publically available Financial Statements and Digital Maturity are taken from Author's calculations

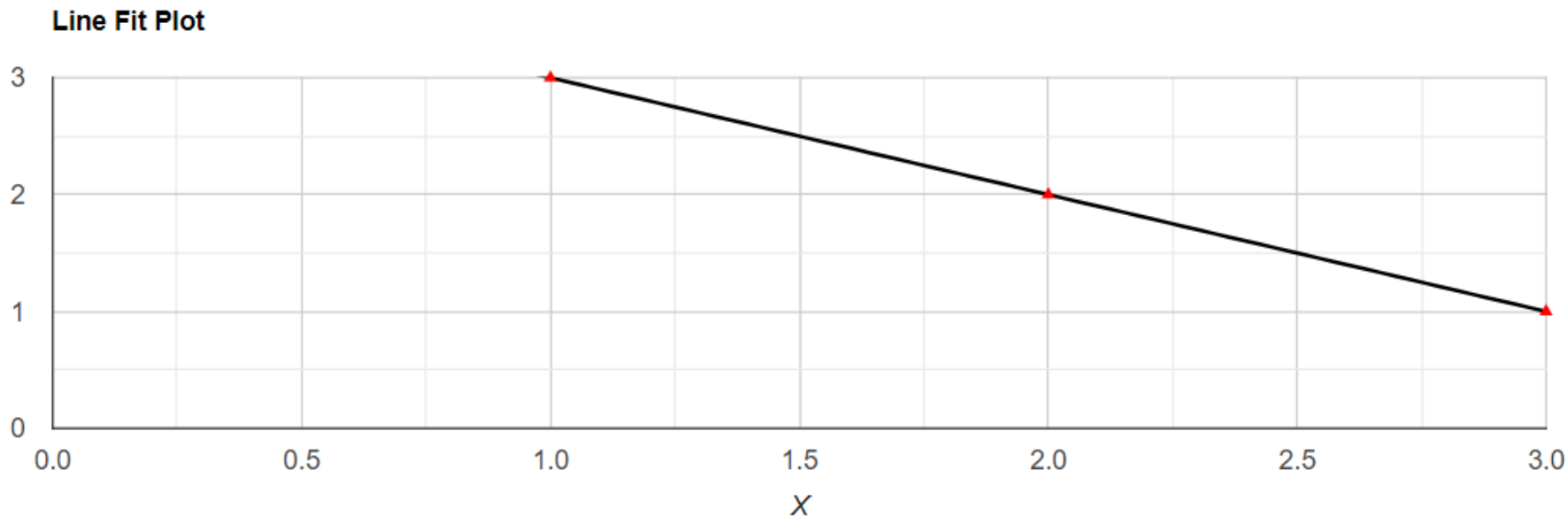
Appendix - M – Statistical Data Analysis: Correlation of overall Digital Maturity to Business Performance indicators *Digital Maturity (Independent variable x-axis) **Business Performance indicators (Dependent variable y-axis)

Correlation of Digital Enablement and Adoption to RER



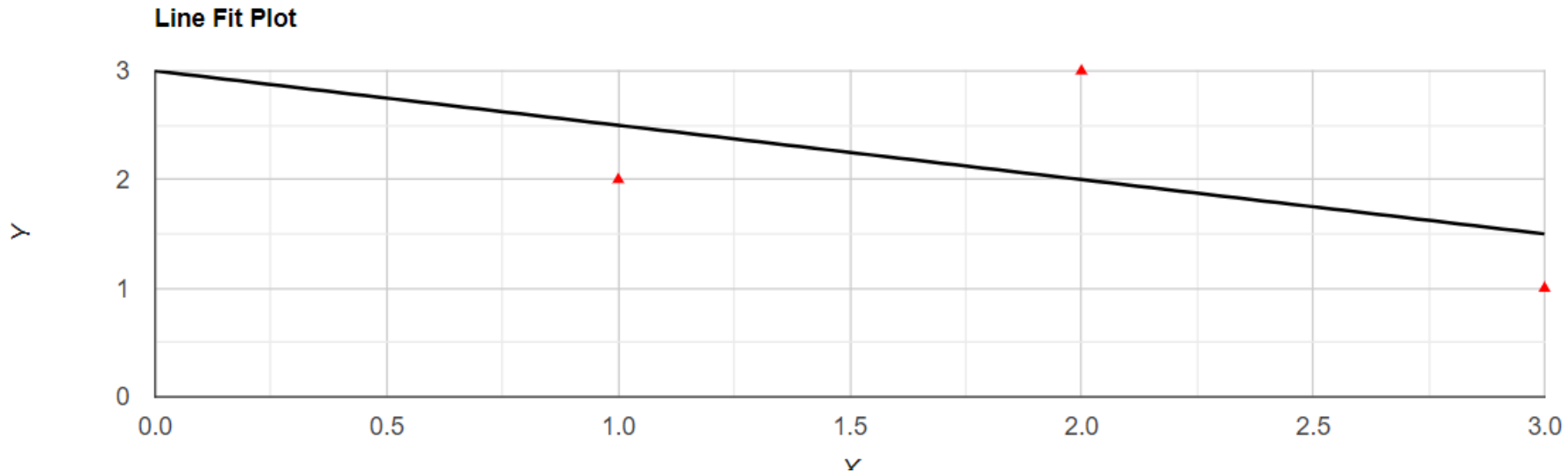
Source: Author’s calculation

Correlation of Digital Enablement and Adoption to FATR



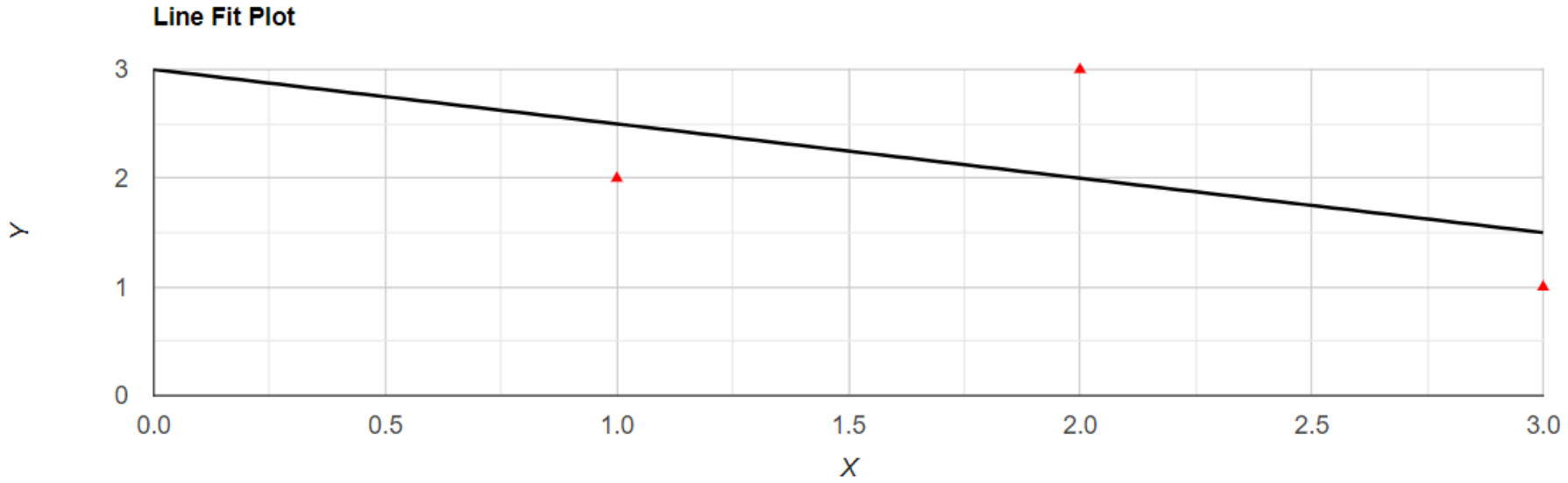
Source: Author’s calculation

Correlation of Digital Enablement and Adoption to EBITM



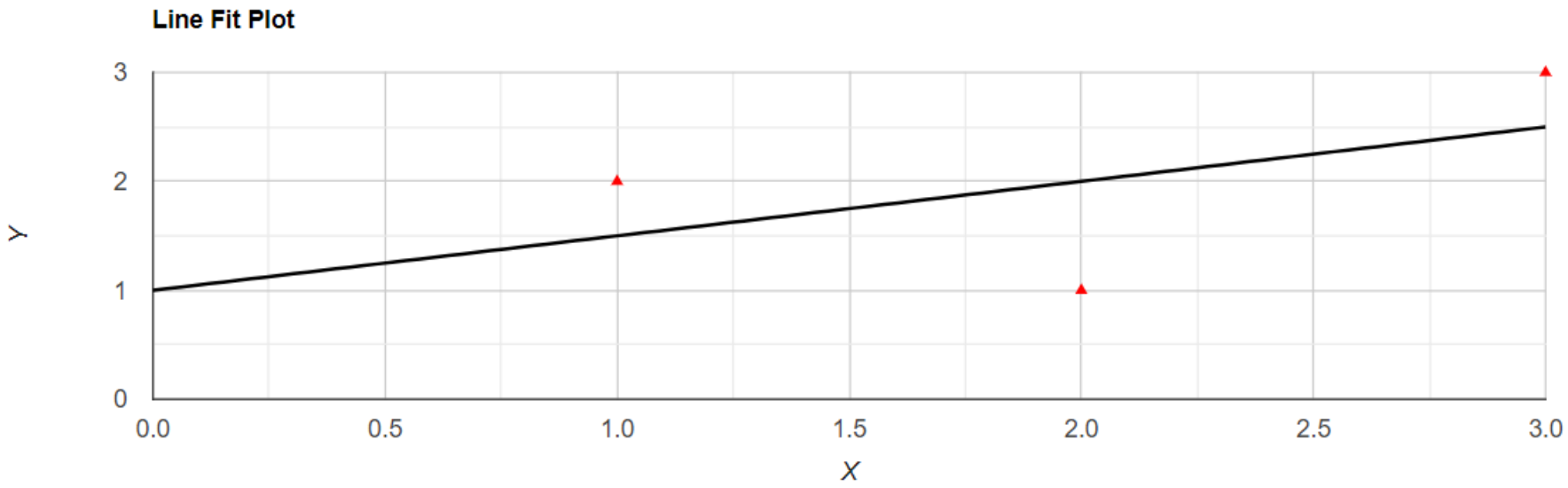
Source: Author’s calculation

Correlation of Digital Enablement and Adoption to NPM



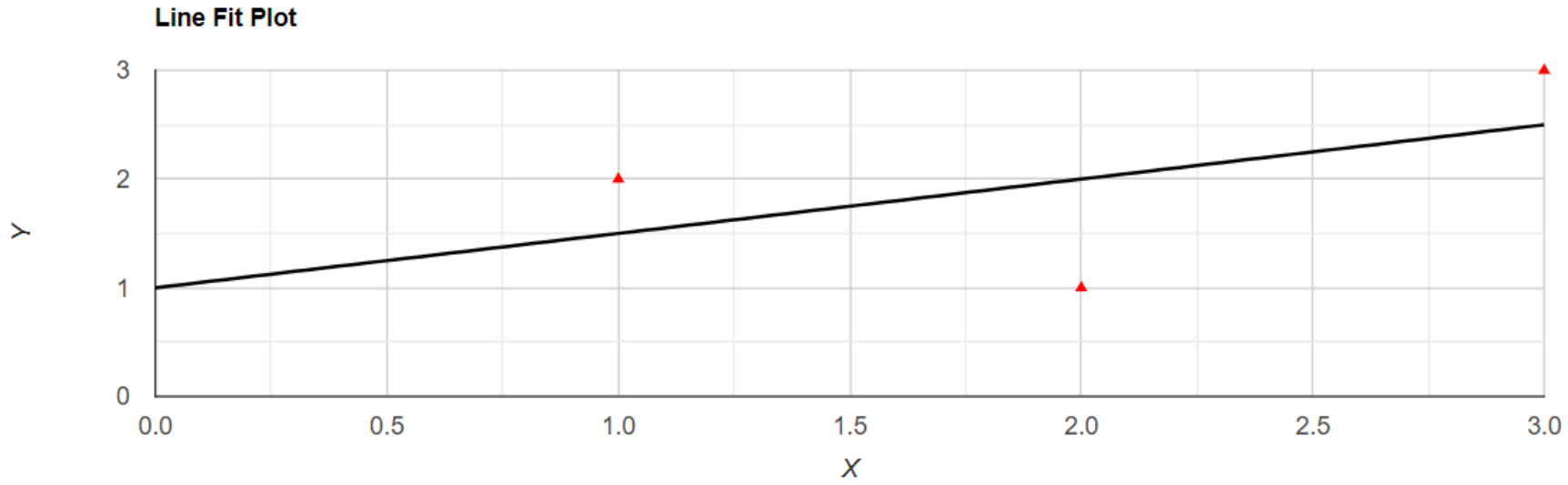
Source: Author’s calculation

Correlation of Digital Enablement and Adoption to RoE



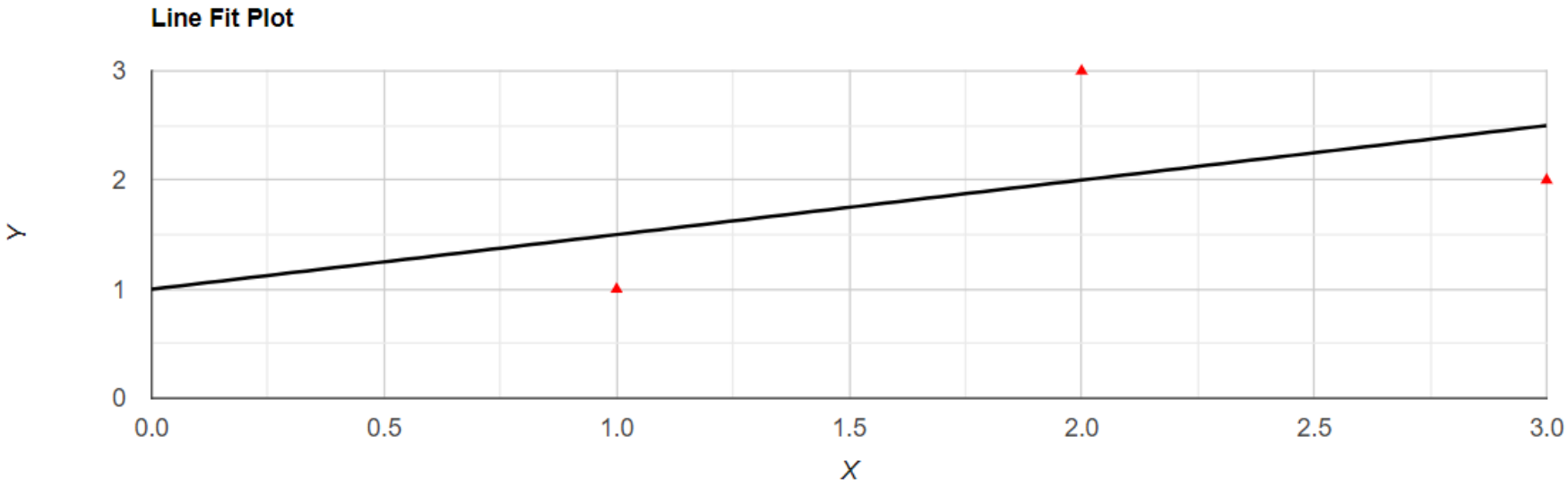
Source: Author’s calculation

Correlation of Digital Enablement and Adoption to RoA



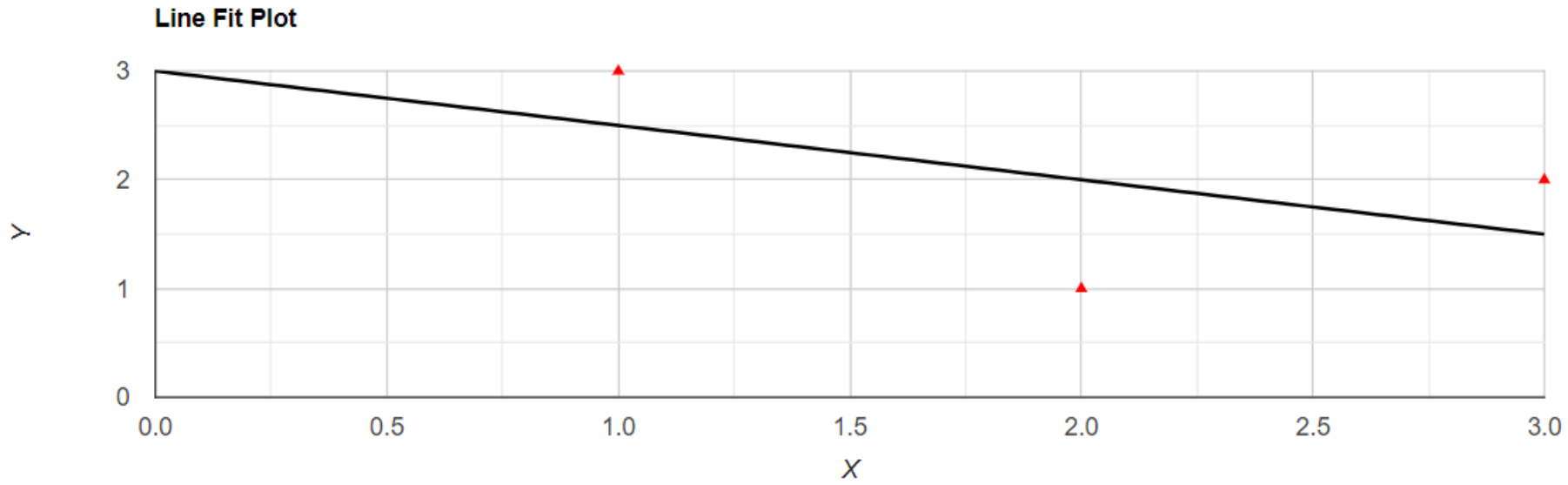
Source: Author's calculation

Correlation of Digital Enablement and Adoption to CLR



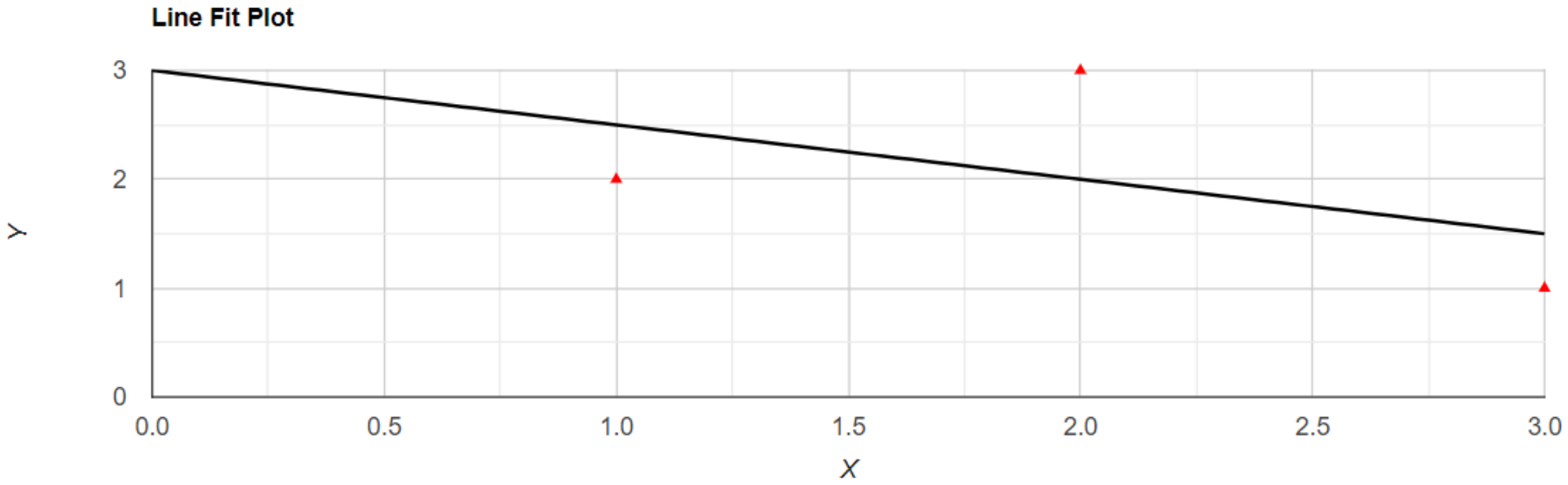
Source: Author's calculation

Correlation of Digital Enablement and Adoption to CTIR



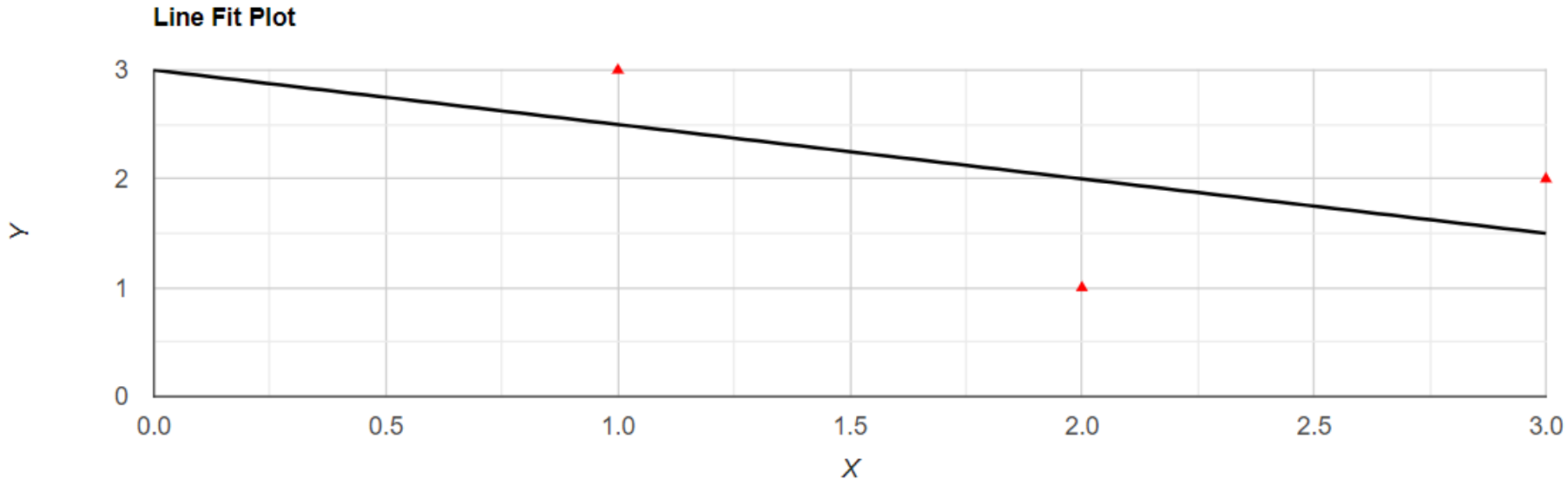
Source: Author's calculation

Correlation of Digital Enablement and Adoption to CAR



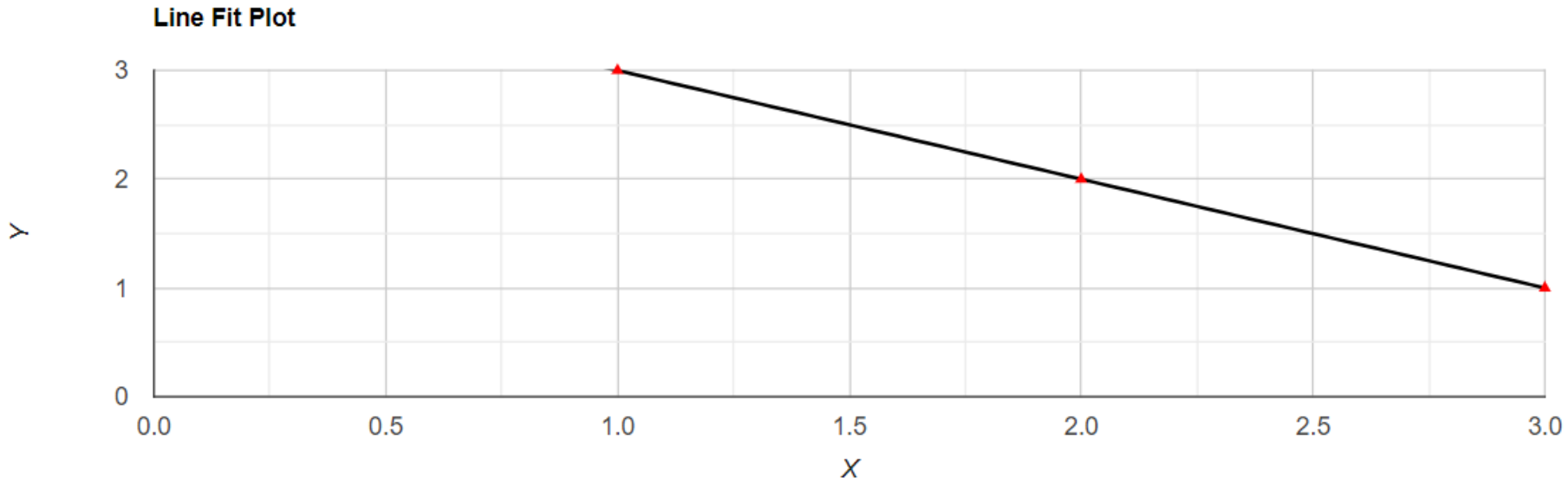
Source: Author’s calculation

Correlation of Leadership and Strategy to RER



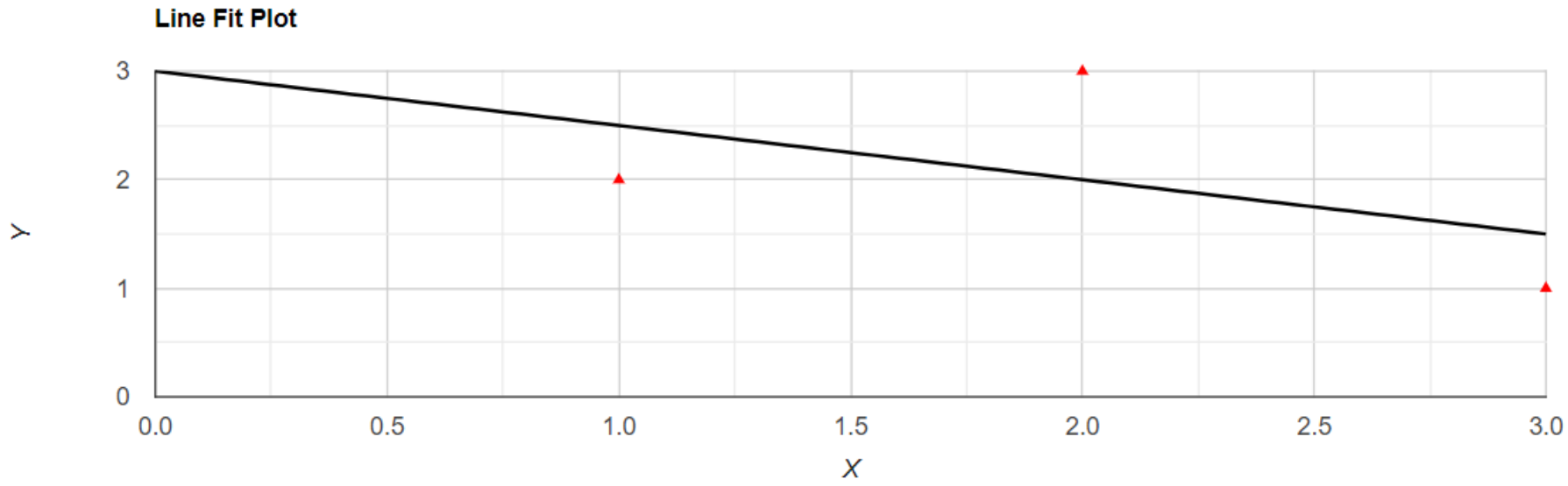
Source: Author's calculation

Correlation of Leadership and Strategy to FATR



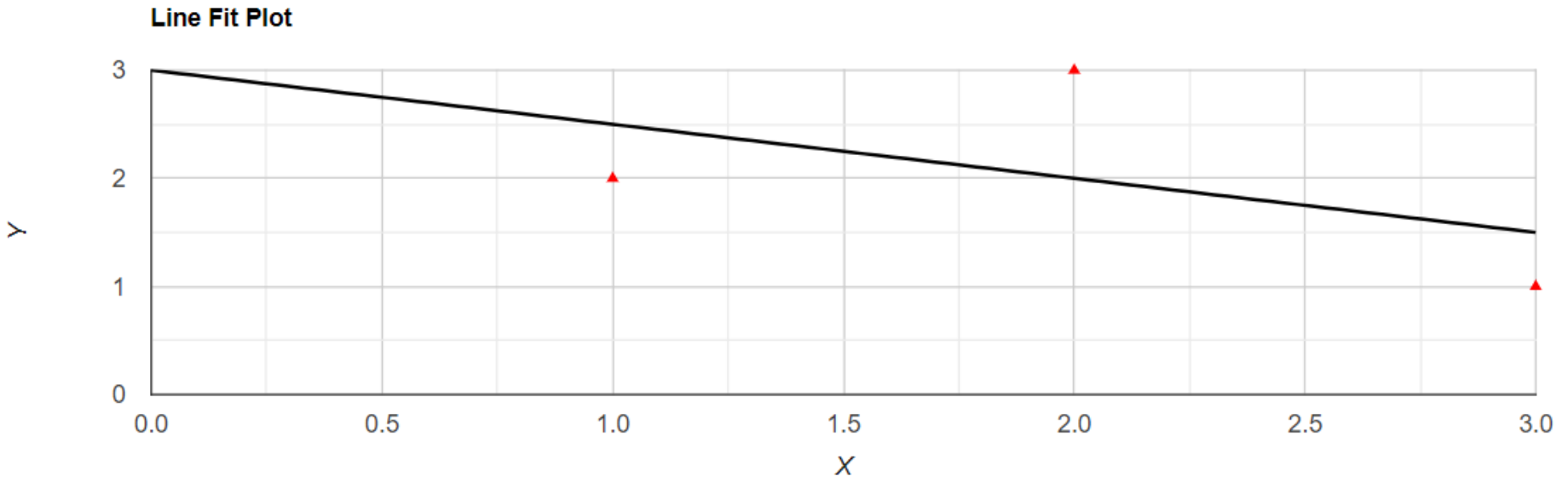
Source: Author's calculation

Correlation of Leadership and Strategy to EBITM



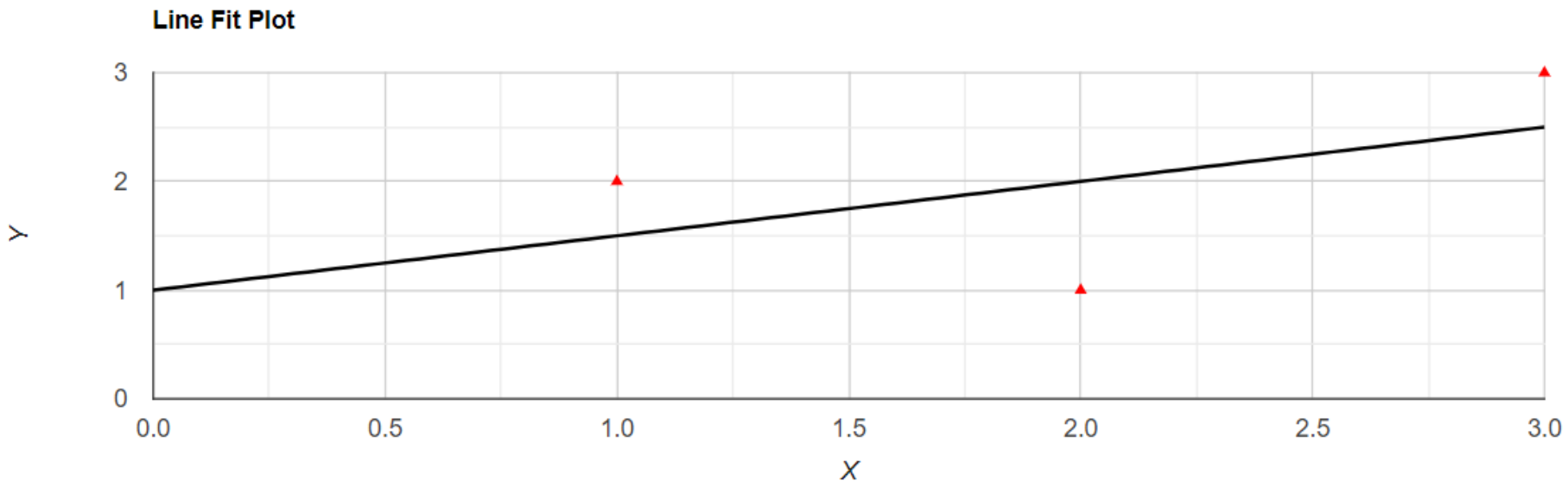
Source: Author's calculation

Correlation of Leadership and Strategy to NPM



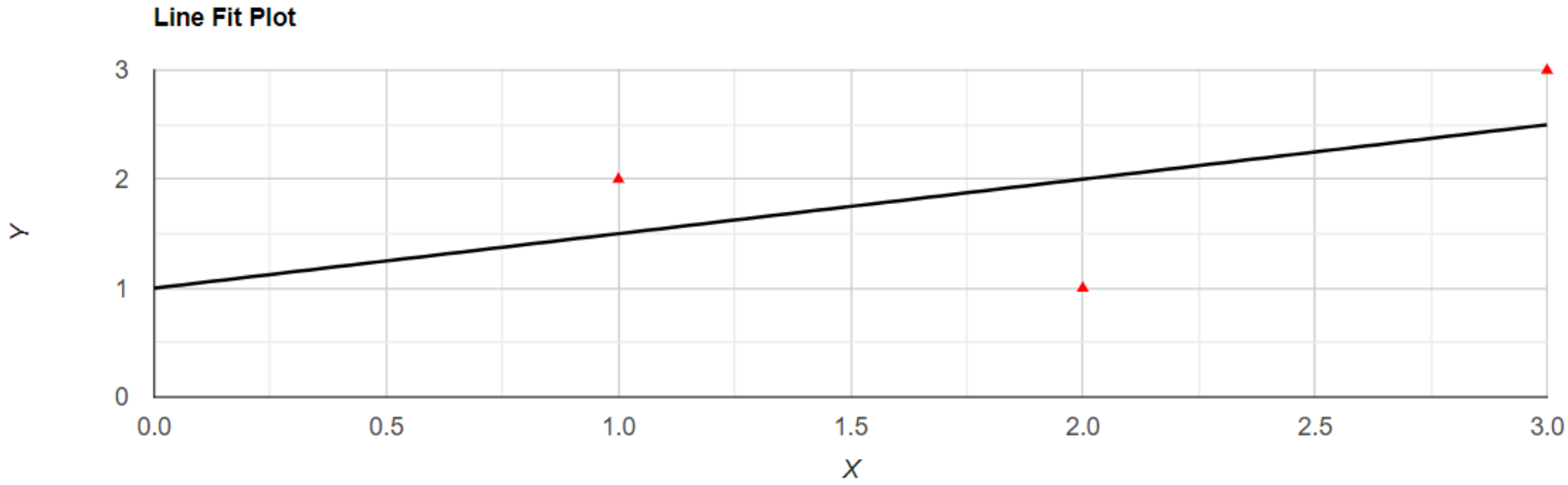
Source: Author’s calculation

Correlation of Leadership and Strategy to RoE



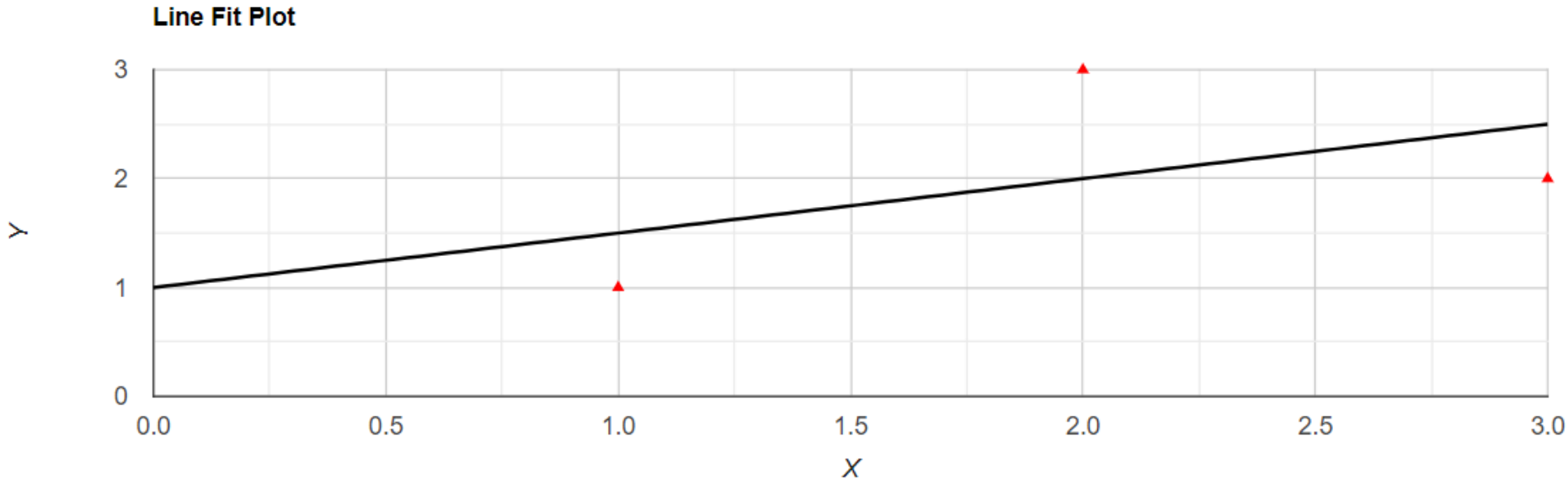
Source: Author’s calculation

Correlation of Leadership and Strategy to RoA



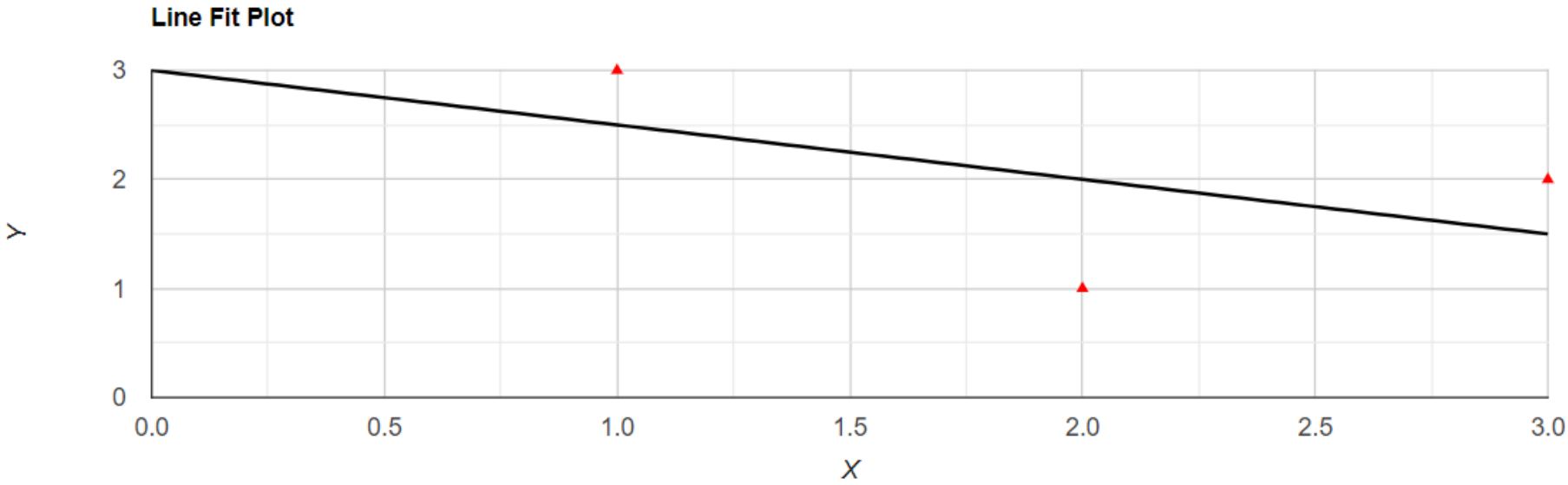
Source: Author's calculation

Correlation of Leadership and Strategy to CLR



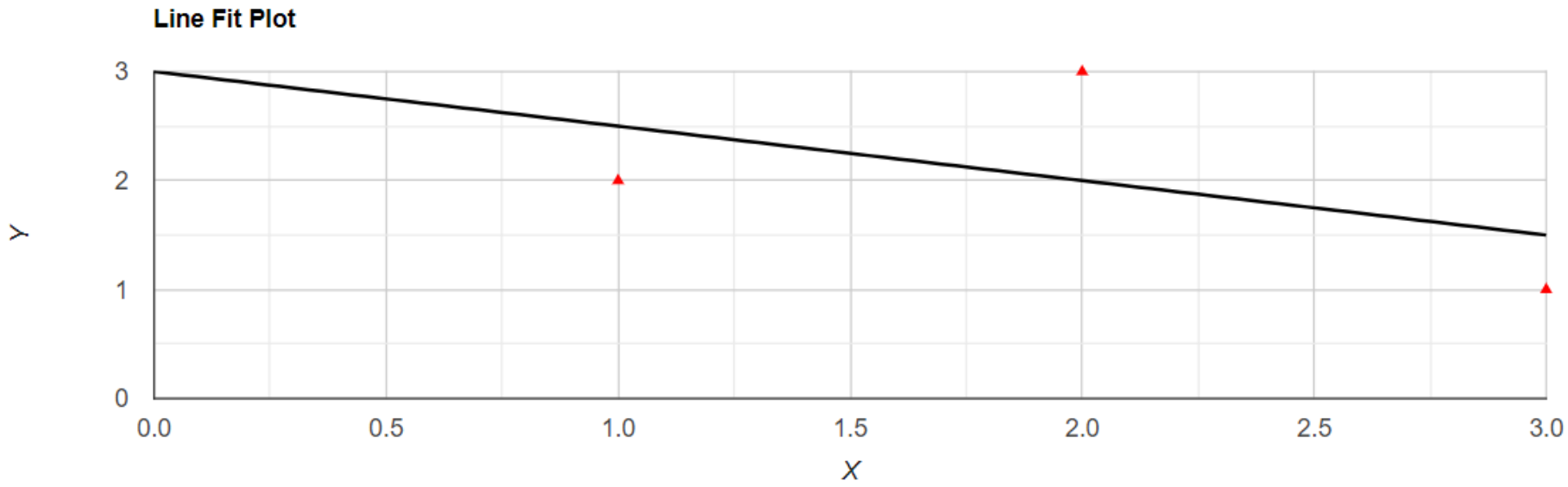
Source: Author's calculation

Correlation of Leadership and Strategy to CTIR



Source: Author’s calculation

Correlation of Leadership and Strategy to CAR



Source: Author’s calculation

Appendix - N – Interview Request Form and Cover Page



University of the Witwatersrand,

[Insert addressee details]

[Contact person]

[Organisation name]

[Organisation address]

[Date]

Dear Sir/Madam,

Re: Permission to conduct research at [insert organisation name].

My name is John-Paul Okkers.

I am studying for a Master in Management: Digital Business in the Wits Business School at the University of the Witwatersrand. I am seeking permission to do research at [insert organisation name].

I am conducting research on the relationship between Digital Transformation and the business' performance of selected South African-based banks. Digital Transformation (also known as Digital Maturity) is widely recognized as the use of technology to radically improve performance or reach of organisations. The South African Banking industry is experiencing growing-competition. The industry has also been hard at work trying to remain abreast of ever-changing customer needs and technology advancements. The impact of the Fourth Industrial Revolution (4IR) is forcing Banks to prioritize innovation toward online-banking channels as well as benchmark Traditional-Banking services with Digital-Financial services offered by Financial Technology Service (FinTech) providers such as Facebook Pay, AliPay, WeChat Pay, Ripple and Chime to name a few.

Organisations, including Banks, are known to use key indicators such as: return on investment, return on equity, profits and share value as drivers behind investment decisions and comparison. Unfortunately Digital Transformation cannot be compared and this is due to the use of emerging Digital technologies as well as previous research on Digital Transformation was not based on facts, rudimentary data analysis or empirical evidence.

The purpose of the research is two-fold: (1) to guide Banks who are looking to motivate and commit funds towards Digital Transformation, and (2) to address some of the gaps left by previous research not based on facts, rudimentary data analysis or empirical evidence.

The research will measure Digital Transformation, using facts and empirical research methods to collect data from staff members employed by [insert organisation name]. In addition, the research will compare the Digital Transformation with the corresponding financial statements, this will be done in an exploratory method which aims to identify relationship in the data.

The research participants will not be advantaged or disadvantaged in any way. They will be reassured that they can withdraw their permission at any time during this project without any penalty. There are no foreseeable risks in participating in this study. The participants will not be paid for this study.

The research data will be password protected and stored for a temporary period before being deleted, in accordance with the data privacy standards of the University of Witwatersrand.

I therefore request permission in writing to conduct my research at your organisation.

Please let me know if you require any further information. I look forward to your response as soon as is convenient.

Yours sincerely,

John-Paul Okkers

0713024949 or 0788005988

694552@students.wits.ac.za

Supervisor details

Brian Armstrong

011 717 3951

Brian.Armstrong@wits.ac.za

Appendix - O – Ethics Clearance

UNIVERSITY OF THE WITWATERSRAND, JOHANNESBURG

SCHOOL OF GRADUATE SCHOOL OF BUSINESS ADMINISTRATION ETHICS COMMITTEE CONSTITUTED UNDER THE UNIVERSITY HUMAN RESEARCH ETHICS COMMITTEE (NON-MEDICAL)

CLEARANCE CERTIFICATE	**PROTOCOL NUMBER: WBS/BA694552/930**
PROJECT TITLE	Relationship between Digital Transformation and Business Performance of selected South African banks
INVESTIGATOR	Mr John-Paul Okkers
SCHOOL/DEPARTMENT OF INVESTIGATOR	MM (Digital Business)
DATE CONSIDERED	11 September 2020
DECISION OF THE COMMITTEE	Approved unconditionally
RISK LEVEL	MINIMAL RISK
EXPIRY DATE	30 JUNE 2021

Matshabaphala

ISSUE DATE OF CERTIFICATE 23 September 2020 **CHAIRPERSON** _____
(Dr MDJ Matshabaphala)

cc: Supervisor: Professor Armstrong

Appendix - P – Turn-It-In Report

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